

**New Hampshire Climate Change Policy Task Force
Draft Action Reports under Development**

**Transportation and Land Use (TLU)
Working Group**

**Prepared by NHDES
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TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards

Summary

New Hampshire should support more stringent, near-term Corporate Average Fuel Economy (CAFE) standards for passenger vehicles and inclusion of heavier passenger vehicles up to 10,000 lbs gross vehicle weight rating (GVWR) in the standards. The latter vehicle class includes large sport utility vehicles (SUVs) and pick up trucks. In addition, the state should support the adoption of CAFE standards for vehicles greater than 10,000 GVWR in the near future. CAFE is the sales-weighted average fuel economy, expressed in miles per gallon (mpg), of a manufacturer's fleet of light-duty vehicles and light-duty trucks. It currently applies to vehicles with a GVWR of 8,500 lbs. or less, manufactured for sale in the United States, for any given model year. New standards recently proposed by the National Highway Traffic Safety Administration (NHTSA)¹ would require that the combined car and light truck fleet meet a 35-mpg average by 2020 (up from the current standards of 27.5 mpg for light cars and 22.2 mpg for light trucks, which were set in 1984). Existing analyses indicate that higher fuel economy is achievable with currently available technology and that significant improvements could be made by 2015.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The Secretary of Transportation has delegated authority to establish CAFE standards to the Administrator of the National Highway Traffic Safety Administration (NHTSA). Congress specified that CAFE standards must be set at the “maximum feasible level” and provided that the Department’s determinations of maximum feasible level be made in consideration of four factors:

- Technological feasibility,
- Economic practicability,
- Effect of other standards on fuel economy, and
- Need of the nation to conserve energy.

The state, through NHDES, should work with regional and national air quality organizations supporting more stringent standards and aggressive phase-in of new standards, achieving significant fuel economy improvements by 2015. The state could also communicate to the New Hampshire Congressional delegation the benefits of more stringent fuel efficiency standards.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Support for more stringent standards could be done with minimal action required. Additional weight to the issue could be provided by legislative action that would encourage and direct the New Hampshire Congressional Delegation to support more stringent standards
 - b. *Resources Required*: Existing state staff
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Significant resistance from auto manufacturers would make difficult the political actions needed to implement more stringent CAFE standards. Higher standards do not have to be based on *existing* technology, but must be based on reasonable assumptions that the necessary technology could be developed adequately to allow manufacturers to meet the standard. Public education and outreach is needed to drive demand to more fuel efficient vehicles. Loopholes within existing CAFE standards that reduce the rule effectiveness must be closed.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: NHDES, Federal gov’t (NHTSA), auto manufacturers

¹ <http://www.nhtsa.dot.gov/CARS/rules/CAFE/overview.htm>

- b. *Parties Paying for Implementation:* Vehicle manufacturers and vehicle purchasers
 - c. *Parties Benefiting from Implementation:* Vehicle purchasers who will have lower fuel costs, companies that provide the technology and equipment to meet the standards.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
- Granite State Clean Cities Coalition, promoting the use of alternative fuel and advanced technology vehicles;
 - Granite State Clean Cars, a voluntary program in which auto dealerships clearly identify vehicles that meet low emission vehicle standards and achieve 30 mpg or greater.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
- a. *Existing:*
 - b. *Proposed:* TLU Action 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
TLU Action 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure
6. Timeframe for Implementation: Immediate efforts are needed. Changes to CAFE standards must allow manufacturers three years to meet the standards after their adoption. NHSTA is required to review the existing standards periodically. As new technology is developed, the standards should be revised to become increasingly stringent.
7. Anticipated Timeframe of Outcome: 10 to 15 years, depending on the level of increase and date by which increases become effective. The NH vehicle fleet turns over (new vehicles replace older ones) about once every 8 years. If new standards were aggressively phased in (within 3 years), the state would realize significant results within 11 years, increasing in future years.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

Timeframe	CO ₂ Emission Reductions (MMTCO ₂ e) at Different CAFE Standards			
	@35 mpg	@40 mpg	@45 mpg	@50 mpg
Short-term (2012)	0.09	0.15	0.21	0.27
Mid-term (2025)	1.13	1.64	2.04	2.37
Long-term (2050)	1.85	2.64	3.25	3.75

2. Economic Effects:

a. Costs:

- i. Implementation Cost: Moderately high for all scenarios
- ii. Timing: Constant / even for all scenarios
- iii. Impacts: Consumer for all scenarios

b. Savings:

i. Potential Economic Benefit:

CAFE Standard	Relative Savings
35 mpg	High
40 mpg	High
45 mpg	Very High
50 mpg	Very High

- ii. Timing: Low short-term / mostly long-term for all scenarios
- iii. Impacts: Consumer – evenly distributed for all scenarios

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- a. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- b. *Social*: This will reduce the countries dependence on oil and therefore ability to be manipulated by foreign countries
- c. *Other*: A significant amount of US dollars would be retained in the US economy rather than being sent abroad to oil producing countries.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- d. *Technical*: Technology currently exists to achieve an average increase of about 10 to 12 mpg. Social acceptance of smaller vehicles will make this goal technically easy to achieve.
- e. *Economic*: Short term additional cost to consumer with long term significant savings. Also supports new technology industries.
- f. *Statutory/Regulatory*: Moderate hurdle to have more stringent standards adopted by the federal government.
- g. *Social*: Strong societal support for reducing vehicle fuel costs which this will, in effect, achieve.

5. Other Factors of Note: Actions supporting more stringent CAFE standards are already undertaken by NH DES.

6. Level of Group Interest: Moderate. This action can be implemented only at the federal level; it is not a program that New Hampshire can implement itself, like TLU Action 1.A.3 (CALEV). Therefore, the working group considered this a supporting action to undertake in the near-term (*i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector*)

7. References:

TLU Action 1.A.2 – Support Fuel Economy Standards for Heavy-Duty Vehicles

Summary

New Hampshire should support establishment of fuel economy standards for all new vehicles greater than 8,500 pounds gross vehicle weight rating (GVWR) to achieve greater CO₂ reductions from future vehicles. The state should also support programs such as EPA's SmartWay Transport Partnership program to increase the fuel economy of existing heavy-duty vehicles. Tractor-trailers consume about two-thirds of all truck fuel and can be made more fuel-efficient through aerodynamic retrofits, low-rolling-resistance tires, and idling reduction technology. Heavy-duty vehicles are very durable, many having a useful life of 20 years or more in the U.S. before being sold in other countries. Improvements to the fuel economy of new trucks would have a significant impact within 10 to 20 years after implementation of tougher standards, but those standards are likely to be 10 or more years away from possible implementation. Using existing technology to improve the fuel economy of existing trucks would have an immediate impact. Action on future and existing trucks would provide both short- and long-term emission reductions.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

Fuel economy standards may be established only by the federal government. Therefore, the mechanism to implement more stringent fuel efficiency standards would be through the New Hampshire Congressional Delegation, with active support from state government for such a program.

To improve the fuel economy of the existing vehicle fleet, New Hampshire could join with EPA in support of the SmartWay Transport Partnership. The state could develop financing options, such as small business environmental improvement loans, for vehicle owner-operators to purchase SmartWay Technology Packages.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

a. *Method of Establishment (e.g., legislation, executive order)*:

- Fuel economy standards are established by the federal government. Support of this action by state government could be done through existing agencies and support from NH's congressional delegation.
- An EPA partnership/financing program would require legislative action.

b. *Resources Required*:

- Existing state staff could assist in providing support of more stringent fuel economy standards.
- New Hampshire would need to identify the appropriate state agency to administer a partnership/financing program, identify a funding source, and provide staff to administer the loan program and coordinate with EPA.

c. *Barriers to Address (especially for medium to low feasibility actions)*: Identification of a funding source and allocation of funds to establish a loan program.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: US Environmental Protection Agency, NH state government, fleet managers, and vehicle owner-operators.
- b. *Parties Paying for Implementation*: Companies that own fleets as well as vehicle owner-operators. Federal funds are also currently available.
- c. *Parties Benefiting from Implementation*: Drivers, fleet managers, and vehicle owner-operators would see cost benefits, as would individuals and companies that rely on freight. Society as whole would benefit from improved air quality.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
 - Corporate Average Fuel Economy Standards for vehicles <8501 GVWR
 - U.S. EPA SmartWay Transport Partnership
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*:
 - b. *Proposed*: TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
TLU Action 1.C.1 – Adopt a Low-Carbon Fuel Standard
6. Timeframe for Implementation:

Improvements to Existing Fleet:	Immediate
Federal Fuel Economy Standards:	10 to 15 years
7. Anticipated Timeframe of Outcome:

Improvements to Existing Fleet:	Immediate
Federal Fuel Economy Standards:	25 to 40 years

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.22 MMTCO₂e/year
 - b. Medium-term (2025): 0.94 MMTCO₂e/year
 - c. Long-term (2050): 1.82 MMTCO₂e/year
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Moderately high
 - ii. Timing: Immediate / higher initial costs
 - iii. Impacts: Business – evenly distributed
 - b. Savings:
 - i. Potential Economic Benefit: Moderate
 - ii. Timing: Constant / even
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease including a reduced incidence of the conditions that cause asthma and that can lead to asthma attacks as well as aggravate other cardiovascular and respiratory conditions.
 - c. *Social*: EPA states that the program contributes to environmental justice.
 - d. *Other*: By increasing energy efficiency we improve energy security by reducing dependence on foreign petroleum

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Medium. The proposed action would involve establishing a loan program in state government.
 - b. *Economic*: Medium. A funding source would be needed to establish a loan program, but federal funding might be available in coming years.
 - c. *Statutory/Regulatory*: High. It is not anticipated that statutory or regulatory changes would be needed to implement this program
 - d. *Social*: High. Cleaner-burning diesel trucks are supported by all sectors. Fuel savings would be strongly supported by the trucking industry.
5. Other Factors of Note:
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
 - *Key Resource*:
Therese Langer, American Council for an Energy-Efficient Economy, February 11, 2004,
<http://www.bipartisanpolicy.org/files/news/finalReport/III.4.a%20-%20Heavy-Duty%20Trucks.pdf>
 - American Council for Energy Efficient Economy, Energy Savings Through Increased Fuel Economy for Heavy-Duty Trucks, (February 11, 2004).
 - US EPA Smartways Home Page, <http://www.epa.gov/smartway/index.htm>.
 - Cheryl Bynum, US EPA, SmartWay Transport Partnership, February 22, 2006 ,
<http://www.nescaum.org/documents/improving-the-fuel-economy-of-heavy-duty-fleets/cherylbynum-1.pdf/>
 - Forr average number of miles driven by age of truck:
http://www1.eere.energy.gov/vehiclesandfuels/facts/2005/fcvt_fotw363.html.

TLU Action 1.A.3 – Adopt California Low-Emission Vehicle (CALEV) Standards

Summary

New Hampshire should adopt California Low-Emission Vehicle (CALEV) standards, including the tailpipe greenhouse gas emissions (GHG) standards. Under the Clean Air Act Section 209, states may not develop their own vehicle emission standards. The exception to that rule is the State of California, which may set its own standards provided they are at least as stringent as federal standards. California standards are typically more stringent than federal standards. The remaining 49 states have the option of either following federal emission standards or adopting the CALEV standards. The CALEV requirements include a tailpipe GHG standard that does not exist for federal emission standards. CALEV also includes a zero-emission-vehicle (ZEV) requirement (electric vehicles). States that adopt CALEV standards may choose to include the GHG and ZEV requirements or not. CALEV states allow only the sale of vehicles certified to CALEV standards.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

Adopting CALEV with the GHG standards would lower New Hampshire's greenhouse gas emissions by reducing emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and hydrofluorocarbons (air conditioner refrigerants) from motor vehicles. States that adopt CALEV are responsible for enforcing the program provisions themselves, unlike states that operate under federal standards, where the standards are enforced by EPA. Therefore New Hampshire would be responsible for enforcing this program.

California has adopted greenhouse (GHG) standards as part of its CALEV program but has not yet been granted the necessary waiver by the Environmental Protection Agency. The waiver denial has triggered litigation that is expected to be resolved in favor of California or approved under a new federal administration after January 2009.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Legislation
- b. *Resources Required*: DES staff, funds for economic and air quality analysis to support legislative action.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: Legislative opposition to California standards

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: State government.
- b. *Parties Paying for Implementation*: It is estimated implementing CALEV in NH would require ½ Full Time Employee both for program passage, rule making, adoption, and on-going support. States have used a variety of funding options, including a fee paid by auto manufacturers, use of state funds (taxpayer), a vehicle registration fee, and others.
- c. *Parties Benefiting from Implementation*: The general public. Cleaner, more fuel-efficient vehicles will yield better air quality. The fuel savings of the vehicles meeting the lowest emissions standards are predicted to offset any higher vehicle cost in existing programs.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

- Governor's Executive Order for use of more efficient state fleet vehicles.
- TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*:
 - b. *Proposed*: TLU Action 1.B.1 – Create a Point-of-Sale Financial Incentive for Higher-Efficiency Vehicles
TLU Action 2.A.6 – Apply a Surcharge to High-Carbon Fuels
6. Timeframe for Implementation: Approximately 3 years to get through legislature and 1 to 2 years to develop and implement a state program.
7. Anticipated Timeframe of Outcome: 3 to 5 years for program implementation, then an additional 8 to 10 years for fleet saturation and significant CO₂ reductions.

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.00 MMTCO₂e/year
 - b. Medium-term (2025): 1.04 MMTCO₂e/year
 - c. Long-term (2050): 1.61 MMTCO₂e/year
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Moderately high
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer
 - b. Savings:
 - i. Potential Economic Benefit: Moderately High
 - ii. Timing: Low short-term / mostly long-term
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: Increased energy efficiency typically has short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
 - d. *Other*: Vehicles certified to CALEV “partial” and “advance technology partial zero emission vehicles” (PZEV and ATPZEV) standards that are sold in states that have adopted CALEV carry a 15-year/150,000-mile warranty. Those same vehicles sold in non-CALEV states carry only the standard warranty (typically 3 years/36,000 miles).

The New Hampshire Automobile Dealers Association has noted there may be negative impacts on customer choice (not as many vehicles available) and increased vehicle costs to the consumers.

All New England states with the exception of New Hampshire have adopted CALEV.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: No significant technical barriers
 - b. *Economic*: Because this program must be enforced by the state, not by the federal government, there will be some cost to the state to implement and enforce the program.
 - c. *Statutory/Regulatory*: This program will require legislative action. In the past there has been opposition in the NH Legislature to adopt any California standards.
 - d. *Social*: It is anticipated there will be high public acceptance of this program that will bring cleaner, more efficient vehicles with longer warranties to NH dealerships.
5. Other Factors of Note: Since all surrounding states have adopted the CALEV standard a large percentage of vehicles sold in NH already meet that standard as dealerships want the ability to trade vehicles with their cross-border dealerships. The GHG portion of the CALEV standard is currently under litigation and the final outcome is not clear, however, early court decisions have upheld the standard.
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the early mid-term (2012) to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
 - <http://www.mwcog.org/uploads/committee-documents/t1hZWfs20061211131143.pdf>
 - <http://www.nescaum.org/topics/mobile-source-controls-and-programs>
 - <http://www.nescaum.org/documents/reducing-ldv-ghg-nescaum-cooper-dec2006.pdf/>
 - http://www.dep.state.fl.us/air/rules/ghg/california/62-285_slides_031808.ppt#1

TLU Action 1.B.1 – Create a Point-of-Sale Financial Incentive for Higher-Efficiency Vehicles

Summary

New Hampshire could create a new vehicle point-of-sale “feebate,” which would provide financial incentives to purchase vehicles that are high in fuel-efficiency and low in greenhouse gases (GHG) emissions, accompanied by financial disincentives to purchase low-efficiency, high-GHG-emitting vehicles. A buyer of a new vehicle would be rewarded with a rebate for a high-efficiency vehicle but would have to pay a fee or surcharge for a low-efficiency vehicle (hence the name “feebate”). The program could be made virtually revenue-neutral by using the surcharges paid on low-efficiency vehicles to cover the rebates on high-efficiency vehicles.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

A point-of-sale feebate on sales of new vehicles encourages the selection of fuel-efficient vehicles during new car purchases by creating financial incentives for their purchase. This action would increase the overall efficiency of the on-road vehicle fleet and bring about reductions in motor vehicle GHG emissions. The feebate would add to existing market signals (e.g., high fuel prices) by prompting consumers to purchase more fuel-efficient cars. An effective feebate would be about 5 percent of the vehicle price – sufficient to elicit the desired level of response from consumers and manufacturers². Unlike the price of fuel, the degree of incentive provided by feebates is controllable entirely through policy and is immune to market fluctuations.

Two main implementation alternatives are apparent: 1) apply the rebate or surcharge at the point of sale (*i.e.*, at the automobile retailer), or 2) apply the rebate or surcharge at initial vehicle registration. The former alternative would have the advantage of immediacy, *i.e.*, the buyer would be aware of the charge prior to making a purchase decision and could weigh the benefit/cost of the feebate when comparing sticker prices in the dealer’s showroom. The latter alternative would reduce the incidence of buyers purchasing vehicles in other states to avoid surcharges on high-GHG-emitting vehicles.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Implementing the feebate would require legislative action through an amendment to RSA 261 (Registration of Vehicles) and a change in Department of Safety Rules (Chapter Saf-C 500 Vehicle Registration Rules), which establishes motor vehicle registration rates, rules, and procedures.
- b. *Resources Required*: Little new revenues would be required; however, an incremental administrative burden would be placed on DMV and /or town clerks to collect the surcharge and disburse the rebate. Additional forms and changes to accounting systems would also be required. A GHG rating system and corresponding feebate schedule would need to be developed and maintained. Administrative costs of the program could be built into the structure of the surcharge. Resources to effectuate the necessary legislative and administrative rule changes would also be required.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: There may be consumer resistance from those who either need higher GHG emitting vehicles (contractors, those with large families, etc.) or have a strong preference for them. The feebate program has been successfully attacked in other states as “anti-SUV” or as amounting to an SUV tax. There may be resistance from town clerks if the burden for administering the feebate program is placed on them without additional resources.

² Bandivadekar, Anup P. (2008) Evaluating the Impact of Advanced Vehicles and Fuel Techniques in US Light Duty Vehicle Fleet, Massachusetts Institute of Technology, (http://web.mit.edu/mitei/research/spotlights/bandivadekar_thesis_final.pdf) 182 pp.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* Town clerks and the Department of Safety – Division of Motor Vehicles, if the feebate is charged at the point of first registration; or Motor Vehicles alone, if the feebate is handled at the point of sale. The Department of Environmental Services would most likely be responsible for developing and maintaining the vehicle GHG rating and feebate schedule.
 - b. *Parties Paying for Implementation:* Purchasers of high-GHG-emitting vehicles; Department of Safety, Department of Environmental Services, and municipalities or automotive dealers.
 - c. *Parties Benefiting from Implementation:* Purchasers of low-GHG-emitting vehicles, as well as the general public, who would benefit from reduced emissions.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
 - a. *Existing:*
 - Federal income tax credit for hybrid vehicles, which expires on December 31, 2010.
 - "Granite State Clean Cars" labeling program
 - b. *Proposed:*
 - TLU Action 1.B.2 – Implement a Carbon-Based Vehicle Registration Fee Structure. This action is very similar to the feebate program but involves a fee applied to annual vehicle registration instead of, or in addition to, a point-of-sale feebate.
 - TLU Action 2.A.5 – Increase the State Gasoline Tax
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:*
 - b. *Proposed:*
 - TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
 - TLU Action 1.A.3 – Adopt California Low-Emission Vehicle (CALEV) Standards
 - TLU Action 1.D.1 – Address Travel Speeds
 - TLU Action 1.D.2 – Address Vehicle Idling
6. Timeframe for Implementation: Legislative action would require one year to complete; following that, 6 to 12 months would be needed to implement the program administratively.
7. Anticipated Timeframe of Outcome: It is anticipated that the feebate would have an immediate impact on vehicle choice. However, assuming an average passenger car fleet turnover of 12.5 percent per year, the outcome would be felt only gradually over an 8-year period.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

Action to Implement	CO ₂ Emission Reductions (MMTCO ₂ e)		
	2012	2025	2050
Feebate of \$500 per 0.01 gallon/mile (new vehicles 14% more fuel efficient)	0.23	0.73	1.00
Feebate of \$1000 per 0.01 gallon/mile (new vehicles 22% more fuel efficient)	0.34	1.07	1.47

1. Economic Effects:

a. Costs:

- i. Implementation Cost: Low
- ii. Timing: Constant / even
- iii. Impacts: State government

b. Savings:

- i. Potential Economic Benefit: Low
- ii. Timing: Constant/even
- iii. Impacts:

2. Other Benefits/Impacts:

- a. *Environmental*: Many higher-fuel-economy vehicles also lower emissions of ozone precursors and particulate emissions; therefore, in addition to GHG reductions this action would reduce harm to vegetation from ozone, and reduce pollutants contributing to regional haze. If, the fee revenues were used to support expansion of public transit, then VMT and associated GHGs emissions could decrease and these benefits could be increased.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: If implemented as a revenue-producing program the revenue could help support public transit, thereby providing greater transportation choice and helping to meet the needs of the growing elderly population and individuals who cannot afford a personal vehicle. There are added advantages through reduced dependence on foreign oil as higher fuel economy leads to reduced overall demand. However, by increasing the cost of vehicles, this measure may – depending on the size of the fee – adversely affect individuals who cannot, or choose not to, use public transportation or purchase a fuel efficient vehicle.
- d. *Other*: Keeps significant US dollars in the US economy rather than sending abroad to oil producing countries.

3. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: The existing variation in vehicle fuel economy is sufficient to allow the establishment of a registration fee. Advanced vehicle technologies (e.g., batteries, fuel cells) are still under development, but the carbon-based registration fee could help to drive technological development by increasing demand for high fuel economy/low carbon vehicles and send a clear market signal.
- b. *Economic*: This measure will have an economic benefit for those who own fuel efficient vehicles. This measure may also create economic opportunities for the State by generating revenues to expand transit opportunities within New Hampshire and between other states. The program can be designed to support itself, so will not be an economic burden to the state budget.
- c. *Statutory/Regulatory*: There may be resistance to adding additional fees to high GHG emitting vehicles and therefore penalizing consumers for their choices. Additionally, feebates must be carefully designed to avoid legal pitfalls, as Maryland's program was deemed to preempt Federal CAFE regulations.
- d. *Social*: There would be social resistance to adding another "tax" but broad and increasing public support for addressing climate change and use of the revenues (if any) to expand transportation options could drive acceptance.

4. Other Factors of Note: If combined with other Actions that improve fuel economy, a feebate has the potential to increase the average fuel economy to a greater degree.

5. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
6. References:
 - <http://www.nescaum.org/documents/reducing-ldv-ghg-nescaum-cooper-dec2006.pdf/>

Draft

TLU Action 1.B.2 – Implement a Carbon-Based Vehicle Registration Fee Structure

Summary

This action would utilize the annual vehicle registration fee to create a financial incentive to purchase high-efficiency/low-greenhouse-gas-emitting vehicles and a financial disincentive to purchase high-GHG-emitting vehicles. The proposed measure would create a sliding scale of annual vehicle registration fees based on vehicle efficiency: Higher-efficiency vehicles would have lower registration fees, while lower-efficiency vehicles would have higher registration fees or surcharges. The program could be made virtually revenue-neutral by using the surcharges paid on low-efficiency vehicles to cover the reduced fees on high-efficiency vehicles, or the program could be used to create revenue to support other actions such as transit options.

The described action is similar to the feebate concept proposed in TLU Action 1.B.1 but differs in one important way: Feebates would provide one-time incentives effective for new vehicle purchases, while variable registration fees would represent recurring, annual incentives.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

A carbon-based vehicle registration fee encourages faster adoption of fuel-efficient vehicles by making the annual cost of registration for inefficient vehicles more expensive. This mechanism would be designed to support the point of sale feebate (TLU Action 1.B.1) and would be implemented several years after the feebate so as not to penalize motorists for vehicles purchased prior to implementation of the system. By making the “inefficiency surcharge” an annual event rather than just a point-of-sale event (which may be effectively hidden and forgotten by rolling it into vehicle financing), the overall goal of increasing vehicle efficiency is supported.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Implementing the carbon-based registration fee would require legislative action through an amendment to RSA 261 (Registration of Vehicles) and a change in the Dept. of Safety Administrative Rules (Chapter Saf-C 500) which established motor vehicle registration rates, rules, and procedures.
- b. *Resources Required*: Little new revenues would be required; however, an incremental administrative burden would be placed on DMV and /or town clerks to collect the surcharge and disburse the rebate. Additional forms and changes to accounting systems would also be required. A GHG rating system and corresponding feebate schedule would need to be developed and maintained. Administrative costs of the program could be built into the structure of the surcharge. If implemented in conjunction with a feebate program (TLU Action 1.B.1.) then the administrative costs of the program would already be mostly covered.. Resources to effectuate the necessary legislative and administrative rule changes would also be required.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: Because this applies to all vehicles, not just new vehicles as in the feebate program (TLU Action 1.B.1.) there are potential equity impacts resulting from relatively higher impacts on low-income drivers who are more likely to own older, less efficient vehicles and cannot afford to purchase more efficient vehicles. There may also be consumer resistance from those who either need higher GHG emitting vehicles (contractors, those with large families, etc.) or have a strong preference for them. Feebate and carbon-based fee programs have been successfully attacked in other states as “anti-SUV” or as amounting to an SUV tax. There may be restrictions from town clerks if the burden for administering the program is placed on them without additional resources.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* Town clerks and the Department of Safety, Division of Motor Vehicles. The Department of Environmental Services would most likely be responsible for developing and maintaining the vehicle GHG rating and fee schedule. If done in conjunction with a feebate program (TLU Action 1.B.1), the same vehicle rating and fee schedule would be applicable to both programs.
 - b. *Parties Paying for Implementation:* Owners of high-GHG-emitting vehicles; Department of Safety, Department of Environmental Services.
 - c. *Parties Benefiting from Implementation:* Owners of fuel-efficient vehicles would have lower annual registration fees, and society would gain from associated environmental and health benefits.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:*
 - b. *Proposed:* All actions that influence the cost of driving (Goal 2A) and improve transit opportunities (Goal 2B), thereby reducing vehicle miles traveled. Goal 1 includes supporting actions that would allow this action to proceed successfully.
6. Timeframe for Implementation: Several years after implementation of TLU Action 1.B.1 (feebates). This delay would allow motorists a time in which to make more efficient vehicle choices and would also allow a phased-in development of the sliding fee scale, which would be more manageable for the implementing agencies.
7. Anticipated Timeframe of Outcome: The outcome of the feebate program would begin immediately. The carbon-based registration fee program would increase the impact of the feebate program over time as fleet turnover occurs and both fees led to a greater percentage of high-fuel-economy vehicles in the fleet.

Program Evaluation

- a. Estimated CO₂ Emission Reductions:

Action to Implement	CO ₂ Emission Reductions (MMTCO ₂ e)		
	2012	2025	2050
New car registration fee differential of \$500 per 0.01 gallon/mile (new vehicles 14% more fuel efficient)	0.23	0.73	1.00

1. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Low
 - ii. Timing: Constant / even
 - iii. Impacts:
2. Other Benefits/Impacts:

- a. *Environmental*: Many higher-fuel-economy vehicles also lower emissions of ozone pre-cursors and particulate emissions. Therefore, in addition to GHG reductions, this action would reduce harm to vegetation from ozone, and reduce pollutants contributing to regional haze. If the fee revenues were used to support expansion of public transit, then VMT and associated GHGs emissions could decrease and these benefits could be increased.
 - b. *Health*: Human health benefits would be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution would reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: If implemented as a revenue-producing program, the revenue could help support public transit, thereby providing greater transportation choice and helping to meet the needs of the growing elderly population and individuals who cannot afford personal vehicles. There are added advantages through reduced dependence on foreign oil as higher fuel economy leads to reduced overall demand. However, by increasing the cost of vehicles, this measure might – depending on the size of the fee – adversely affect individuals who cannot, or choose not to, use public transportation or purchase fuel-efficient vehicles.
 - d. *Other*:
3. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: The existing variation in vehicle fuel economy is sufficient to allow the establishment of a registration fee. Advanced vehicle technologies (e.g., batteries, fuel cells) are still under development, but the carbon-based registration fee could help to drive technological development by increasing demand for high fuel economy/low carbon vehicles and send a clear market signal.
 - b. *Economic*: This measure would have an economic benefit for those who own fuel-efficient vehicles. This measure might also create economic opportunities for the state by generating revenues to expand transit opportunities within New Hampshire and between other states. The program could be designed to support itself so as not to be an economic burden to the state budget.
 - c. *Statutory/Regulatory*: Adding a new fee will involve political challenges, and may require legislation to implement. Given level of support for climate change actions now this seems plausible.
 - d. *Social*: There would be social resistance to adding another “tax” but broad and increasing public support for addressing climate change and use of the revenues to expand transportation options could drive acceptance.
 4. Other Factors of Note:
 5. Level of Group Interest: High. The working group considered this an essential action to undertake in the early mid-term (2012) to achieve significant reductions in CO₂ emissions from the transportation and land use sector.
 6. References:

TLU Action 1.C.1 – Adopt a Low-Carbon Fuel Standard

Summary

New Hampshire could reduce greenhouse gas (GHG) emissions by adopting a Low-Carbon Fuel Standard (LCFS). This mechanism would reduce emissions by ensuring that the mix of fuels sold in New Hampshire would meet, on average, a set standard for GHG emissions measured in CO₂ equivalent gram per unit of fuel energy sold. The standard would be measured on a lifecycle basis to account for all emissions from fuel consumption and production, including the “upstream” emissions that are major contributors to the global warming impact of transportation fuels.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

Fuel supply and distribution infrastructure limitations necessitate a regional approach to adoption of a LCFS. NHDES currently participates in LCFS working groups with both NESCAUM (Northeast States for Coordinated Air Use Management, which incorporates all New England states plus New York and New Jersey) and the NEG-ECP (Northeast Governors-Eastern Canadian Premiers). Governor Deval Patrick (MA) has recently invited all Northeast states to participate in a regional effort. A Northeast LCFS would need to identify lower-carbon fuel potentials for the region, including availability of biomass for regional production of advanced biofuels such as cellulosic ethanol and biodiesel. Other alternative vehicle fuels like natural gas and propane also offer lower carbon impacts than conventional petroleum fuels, despite their being fossil fuels themselves. Natural gas can be a very-low-carbon fuel when recovered from landfill operations, animal feed and waste facilities, and other non-traditional sources. Technological innovation would also be an important component of a successful LCFS, with increased use of battery electric vehicles charged by low-carbon energy (solar, wind, etc.) as a key strategy to meet such a standard.

If implemented along the lines of California’s program, the LCFS would utilize market-based mechanisms to allow providers to choose how they reduce emissions while responding to consumer demand. Providers could, for example, purchase and blend more low-carbon ethanol into gasoline products, purchase credits from electric utilities supplying low-carbon electrons to electric passenger vehicles, diversify into low-carbon hydrogen as a product, or choose new strategies yet to be developed.

Determination of the carbon intensity of a given fuel would require a full lifecycle analysis, including secondary impacts such as those now being realized with corn-based ethanol, where fuel corn is competing with food crops for agricultural land and forcing new land to be cleared.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Work with Northeast states and eastern Canadian provinces to develop a regional standard, then have the standard adopted by each jurisdiction through appropriate legislation or by executive order.
- b. *Resources Required*: Staff to participate in regional planning and development rule language, then a program within DES or DOS to monitor and enforce compliance with the fuel standards.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: Political will to pass legislation; cost and availability of biofuels; cost and availability of electric vehicles, vehicle batteries, and other advance technologies.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: State Government, fuel providers, vehicle manufacturers
- b. *Parties Paying for Implementation*: Fuel companies and consumers
- c. *Parties Benefiting from Implementation*: Consumers and environment

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Granite State Clean Cities Coalition, encouraging the use of alternative fuel and advanced technology vehicles
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*:
 - b. *Proposed*: TLU Action 1.A.3 – Adopt California Vehicle Low-Emission Vehicle (CALEV) Standards
TLU Action 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure
GLA Action 4.1.2 – Increase Use of Cleaner Fuels and Advanced Technologies
6. Timeframe for Implementation: Development of a LCFS for the region needs to begin now so that a standard would be available for adoption by the region in the next 3 to 5 years. Phase in of the standard would occur over the next 10 to 15 years, achieving a 10% reduction in about 2025.
7. Anticipated Timeframe of Outcome: 2025

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.00 MMTCO₂e/year
 - b. Medium-term (2025): 0.89 MMTCO₂e/year
 - c. Long-term (2050): 1.32 MMTCO₂e/year
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Immediate / higher initial cost
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Moderate
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer – evenly distributed
3. Other Benefits/Impacts:
 - a. *Environmental*: Many alternative fuels also lower emissions of ozone pre-cursors and particulate emissions, reducing harm to vegetation from ozone, and reducing regional haze issues. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: This would lead to reduced exposure to particulate matter, toxic air contaminants, and ground level ozone. Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: Reduced dependence on foreign oil; regional economic development from new local fuels industry
 - d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Available vehicle technology (batteries/fuel cells/etc) is still developing, but standards such as this also help to drive such technology development by providing a guaranteed market. This standard would also drive development of advanced biofuels which currently exist, but are not yet being produced on a commercial scale.
 - b. *Economic*: Will likely require incentives to start market development
 - c. *Statutory/Regulatory*: Will require legislation to implement. Given level of support for climate change actions now this seems plausible
 - d. *Social*: Very high. Broad public support given climate change awareness and recent oil company profits.
5. Other Factors of Note:
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the early mid-term (2012) to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
 - A Low Carbon Fuel Standard for California, Part 1: Technical Analysis and Part 2: Policy Analysis, August 1, 2007, http://www.energy.ca.gov/low_carbon_fuel_standard/
 - <http://www.travelmatters.org/calculator/transit/methodology>

TLU Action 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure

Summary

This action would promote development and deployment of alternative fuel vehicles (AFV) and associated fueling infrastructure (natural gas, propane, ethanol, biodiesel, etc.). It would also promote advanced technology vehicles such as hybrid electric vehicles (HEV), plug-in hybrids (PHEV), advanced electric vehicles, and fuel cell vehicles (FCV).

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

New Hampshire would promote the use of advanced technology and alternative fuel vehicles by helping to increase the availability and demand for these fuels and vehicles. This action is consistent with the state's objectives of reducing emissions from fossil fuels and our dependence on foreign oil. In response to rising petroleum prices, advanced technology vehicles would also provide users with lower-cost transportation fuel options. In this regard, the use of advanced technology and alternative fuel vehicles to reduce GHG emissions would be at least partially driven by market forces.

Conventional HEVs combine conventional gas and diesel engines and braking systems with hybrid drive systems to create stored battery power that replaces fuel at lower speeds, thereby boosting mpg and reducing emissions. PHEVs are similar to HEV's but add a plug-in component to get much of their energy by connecting directly to the electric grid. FCVs are essentially electric vehicles that get their energy from on-board hydrogen fuel cells which power their electric motors. AFVs include dedicated natural gas, propane, electric, and other vehicles designed to run on a fuel other than gasoline or diesel.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: The combination of increasing petroleum costs and greenhouse gas emission legislation may help to drive this development, but investment by federal and state government in research and development is needed, as is early adoption by state and federal fleets. Continued support for federal programs that provide funding for both technology development and deployment is critical.
- b. *Resources Required*:
 - i. Resources include existing DES staff, for which funding is available through 2010. Funding is not guaranteed beyond that point, so additional funds could be required.
 - ii. Utilities might need to make changes in domestic generation and distribution of electricity if there was widespread adoption of PHEVs resulting from additional demand on the grid. Lower non-peak rates would encourage recharging overnight when the existing utilities were under-utilized. Infrastructure changes to provide plug in sources for PHEV's would be needed and would be relatively easy to implement. Development of alternative fuel infrastructure (natural gas/hydrogen/propane) is relatively expensive, but could be supported by large fuel users who would save in the long run because of lower fuel costs.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: The cost of infrastructure development for alternative fuel vehicles is a significant barrier, but federal funding is available to help offset those costs. Hybrid and PHEV development is moving forward quickly and will likely be available by 2010 to 2012, though perhaps on a limited scale. FCV's are currently very expensive and hydrogen fuel is unavailable. Range of both FFVs and full electric vehicles must expand to reach broad public acceptance.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* Promotion of these vehicles would be done by both government and environmental groups. Automobile manufacturers are responsible for developing and marketing the vehicles. Fuel providers and utilities would be involved in developing the necessary fueling/charging infrastructure.
 - b. *Parties Paying for Implementation:* Some of the promotional efforts can be covered by federal funding, but much will be the responsibility of state government. Ultimately the consumers will pay a higher cost for these vehicles, but it is anticipated those costs will be offset by fuel savings.
 - c. *Parties Benefiting from Implementation:* Automobile manufacturers through unit sales. Consumers (both residential and commercial) by having lower cost transportation fuel options. With PHEV's, domestic generators of electricity and electric utilities with under utilized capacity or favorable market conditions.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Granite State Clean Cities Coalition, promoting the use of advanced technology and alternative fuel vehicles.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:*
 - b. *Proposed:* TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
 TLU Action 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
 TLU Action 1.B.1 – Create a Point-of-Sale Financial Incentive for Higher-Efficiency Vehicles
 TLU Action 1.C.1 – Adopt a Low Carbon Fuel Standard
 GLA Action 4.1 – Revise State Vehicle Procurement Policy
6. Timeframe for Implementation: The Granite State Clean Cities program has been promoting these vehicles and fuels since 2002, with membership in the coalition growing each year. Continued efforts are needed to build demand for vehicles and fuels. PHEVs are expected to be on the market in 2010 to 2012. Continued escalation of petroleum pricing would help drive this market; but eventual consumer acceptance of higher prices or any downturn in prices would stall such growth, necessitating the continued involvement of government to provide incentives and influence the market. The FCV market is unknown and would have to compete with an ultra-competitive PHEV market.
7. Anticipated Timeframe of Outcome: 2010 through 2050

Program Evaluation

1. Estimated CO₂ Emission Reductions: This action not individually quantified.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Moderately high
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer - regressive
 - b. Savings:
 - i. Potential Economic Benefit: Very High
 - ii. Timing: Low short-term / mostly long-term
 - iii. Impacts: Consumer – evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: This action would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social* : Reduced reliance on foreign oil and continued use of the automobile for transportation.
- d. *Other*: Growth of nuclear energy in the domestic generating mix.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Minimal technical challenges, technology is rapidly improving
- b. *Economic*: Continued escalation of petroleum costs will make PHEV's more desirable
- c. *Statutory/Regulatory*: Growth of generating facilities
- d. *Social*: Continued use of the automobile provides minimal social change

5. Other Factors of Note: PHEV use is projected to climb over decades (2010 to 2050) to reduce dependence on petroleum energy for transportation and to rely more on the energy from the electric grid. During this period, generating facilities with high emissions will either be retrofitted or retired and replaced with lower emitting facilities. Thus, net emissions are projected to be greatly reduced. Additional generating capacity will be needed for U.S. economic growth but currently, upwards of 40% of generating capacity in the U.S. is reduced during the overnight load. Off peak charging of most PHEV's will occur during this period.

It is projected that a PHEV sedan could be charged for three or four hours on a 120-V outlet and a commercial delivery van for four or five hours on a 240-V connection. For the typical consumer, this may require an additional outlet in their garage, or on the exterior of their house, or additional outlets where the vehicles are parked overnight. Use of all fuels and technologies must be analyzed on a full life cycle energy balance to ensure sustainable, verifiable GHG reductions.

6. Level of Group Interest: High to medium. The working group was split between categorizing this action as an essential near term action and a supporting action to undertake in the near-term. The action directly supports other essential actions such as a low carbon fuel standard, feebates, and carbon-based registration fees, and by itself can achieve moderate reductions, but in order to achieve substantial CO₂ reductions from the transportation and land use sector this action must be undertaken in concert with other essential actions.

7. References:

- www.granitestatecleancities.org
- <http://www1.eere.energy.gov/cleancities/>
- <http://dnr.wi.gov/environmentprotect/gtfgw/documents/PHEVExecSumvol1.pdf>
- http://mydocs.epri.com/docs/CorporateDocuments/EPRI_Journal/2005-Fall/1012885_PHEV.pdf
- <http://www.fueleconomy.gov/feg/fuelcell.shtm>

TLU Action 1.C.3 – Install Retrofits to Address Black Carbon Emissions

Summary

This action would install retrofit technologies on diesel trucks with a model year of 2006 and older, or retire diesel trucks and replace them with new technology and cleaner operating engines to achieve reductions of black carbon particulate matter. Also, retrofit technologies would be installed on diesel non-road equipment, including construction equipment, diesel generators, and the like.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*) :

Black carbon is formed through the incomplete combustion of organic fuels and is a major component of particulate matter (PM), or soot, produced by diesel engines. This substance has been identified as having a large and fast-acting warming effect on the atmosphere. Black carbon absorbs light (thus increasing heat) in both airborne particles and in particles deposited on snow pack, where they reduce the snow's reflectivity. Fine PM can travel long distances on air currents and is a major cause of regional haze and air pollution contributing to respiratory ailments. Measures to control black carbon emissions would therefore be beneficial in both mitigating climate change and protecting public health.

Diesel trucks built in 2007 and later include technology that dramatically reduces PM emissions. For older trucks, there are various retrofit technologies available for exhaust systems to reduce PM emissions from diesel engines. For non-road diesel vehicles and equipment, emissions standards will not be implemented until future years, so all such vehicles and equipment would benefit from PM emission retrofits.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Executive Order to require retrofits for equipment working on state contracts and for all state vehicles (as feasible - retrofits do not exist for all equipment). Create awareness and promote the installation of retrofit technologies or retirement of diesel engines with a model year of 2006 or older.
- b. *Resources Required*: State staff to implement program. Funds to pay for equipment. Ranges from providing messaging and creating awareness to mandating retrofits on certain fleets, government, commercial, etc.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: Depending on the type of vehicle, retrofits can range in costs from \$1,000 to \$10,000 per vehicle.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: Diesel equipment owners, government.
- b. *Parties Paying for Implementation*: Costs can be included in construction contract costs, covered by available federal grants, or paid by diesel equipment owners.
- c. *Parties Benefiting from Implementation*: General public health as well as operators of diesel equipment who have the greatest exposures.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

- Federal Diesel Emissions Reduction Act, currently providing some limited funds for diesel retrofits and engine rebuilds.
- Ultra Low Sulfur Diesel requirements now in place for on-road fuel and scheduled for non-road fuel in 2010 allows use of most effective technology, particulate filters.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*:
 - b. *Proposed*: GLA Action 4.2.1 – Reduce Diesel Particulate Emissions through Use of Retrofit Devices
6. Timeframe for Implementation: Immediate, as diesel retrofit technologies currently exist.
7. Anticipated Timeframe of Outcome: 2008 through 2025. Beyond 2025, diesel trucks with a model year of 2006 or older will be twenty years or older and will begin to be retired. Some non-road engines will likely continue to benefit from retrofits beyond this time frame.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

Action to Implement	CO ₂ Emission Reductions (MMTCO ₂ e)		
	2012	2025	2050
Employ DOCs (reduce PM emissions by 25%)	0.07	0.40	0.70
Employ FTFs (reduce PM emissions by 50%)	0.14	0.80	1.39
Employ DPFs (reduce PM emissions by 85%, increase diesel fuel use by 3%)	0.23	1.30	2.25

2. Economic Effects:

- a. Costs:

- i. Implementation Cost: Moderate
- ii. Timing: Immediate / higher initial costs
- iii. Impacts: Business – evenly distributed

- b. Savings:

- i. Potential Economic Benefit: Low
- ii. Timing: Constant / even
- iii. Impacts:

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: The reduced health impacts will result in overall benefits to the economy through reduced healthcare costs as well as the avoided cost of lost productivity due to sick days.
- d. *Other*

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There are minimal technical challenges anticipated as the technology already exists.
- b. *Economic*: There may be resistance at the cost of \$1,000 to \$10,000 per unit for particulate traps.
- c. *Statutory/Regulatory*:
- d. *Social*:

5. Other Factors of Note: There are three basic types of retrofits:

Diesel Oxidation Catalysts (DOCs) can be used on virtually any diesel engine and will reduce PM by approximately 25%. DOCs are similar in appearance to mufflers and there is no maintenance involved after installation and devices usually last for six years. They may not be appropriate for engines older than 1990. Total installation costs are in the range of \$1,000 - \$2,000.

Flow through Filters (FTFs) work similarly to DOCs but have additional filtering material, e.g. wire mesh to capture more PM. FTFs will reduce PM by approximately 50%. FTFs require a duty cycle to create a minimum exhaust temperature, and not all diesel vehicles are able to meet this criteria. There is no maintenance involved after installation and devices usually last for six years. Installation costs are normally in the range of \$3,000 - \$4,000.

Diesel Particulate Filters (DPFs) can be either active or passive. A passive DPF works by simply filtering the exhaust flow. An active DPF relies on additional energy to increase the heat in the exhaust to burn off excess PM. DPFs reduce PM by approximately 85%. A passive DPF requires a duty cycle to create a minimum exhaust temperature and not all diesel vehicles are able to meet this criteria. Active DPFs can be used with virtually any diesel engine. DPF filters must be cleaned with a special machine every 12 to 24 months at a fee of \$200 to \$400. DPFs will also increase fuel use by 1 to 3% for passive applications and up to 7% for active applications. Installation is normally in the range of \$5,000 - \$10,000.

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

- <http://www.epa.gov/OMS/retrofit/>
- <http://www.epa.gov/ne/eco/diesel/retrofits.html>
- <http://www.epa.gov/cleandiesel/documents/retrofit-tech-prog-exp.07-2005.pdf>
- <http://www.epa.gov/otaq/retrofit/documents/f02048.pdf>
- <http://www.arb.ca.gov/diesel/documents/rrpFinal.pdf>
- <http://www.arb.ca.gov/diesel/documents/rrpapp3.PDF>
- http://www.marama.org/diesel/urbanfleets/documents/Urban_Fleets_%20050512_%20WescottDieselStudy.pdf
- <http://www.mass.gov/dep/water/wastewater/diesel.htm>

TLU Action TLU 1.D.1 – Address Travel Speeds

Summary

Reduce speeds on state and interstate highways to improve overall vehicle fuel efficiency, either by strict enforcement of existing speed limits, with a current maximum of 65 mph, or by lowering the maximum highway speed limit to 55 mph.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

U.S. Department of Energy data show that fuel economy decreases rapidly at speeds above 60 mph: the average loss in fuel economy is 8.2 percent when speed is increased from 65 to 70 mph. At a posted speed of 65 mph, many vehicles travel at 65 to 75 mph; and a significant percentage of traffic moves at even higher, less efficient speeds. The publication “Reducing Traffic Speed” by the Technology Transfer Center New Hampshire LTAP at UNH states: “Police Enforcement lowers traffic speeds when police consistently issue tickets. However, cities and towns must commit personnel for a long time. When enforcement ends, drivers will return to the prior speeds.” The result of diminished enforcement is that motorists on major highways drive in excess of 65 mph. Stricter speed enforcement would benefit those who already adhere to speed limits as well as those who prefer to exceed speed limits. The benefits would come in the form of fuel savings, emission reductions, and reduced incidence of highway injuries and fatalities.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Executive Order and/or legislation.
- b. *Resources Required*: Department of Transportation, Law Enforcement, funds for new speed limit signs.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: Politics associated with the change, enforcement costs.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: State and local government.
- b. *Parties Paying for Implementation*: State and local government.
- c. *Parties Benefiting from Implementation*: Consumers – safer roads, and better gas mileage.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

- a. *Existing*:
- b. *Proposed*:

6. Timeframe for Implementation: 6 months to 1 year to pass legislation, proceed through public notice and outreach, and develop coordination/cooperation among law enforcement agencies. Changing speed limit signs could be done in about 2 weeks.

7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO₂ Emission Reduction:

Timeframe	CO ₂ Emission Reductions (MMTCO ₂ e per year)	
	Enforce Current Highway Speed Limits ³	Lower Posted Highway Speed Limits ⁴
Short-term (2012)	0.06	0.11
Mid-term (2025)	0.18	0.35
Long-term (2050)	0.25	0.48

2. Economic Effects:

a. Costs:

- i. Implementation Cost: Low for both scenarios
- ii. Timing: Constant / even for both scenarios
- iii. Impacts: State government for both scenarios

b. Savings:

- i. Potential Economic Benefit: Moderate and moderately high, respectively
- ii. Timing: Low short-term / mostly long-term for both scenarios
- iii. Impacts: Consumer – evenly distributed for both scenarios

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. There will be other health benefits due to the reduction in car accidents brought about by safer highways.
- c. *Social*: It will impact drive times but consumers will save money & highways will be safer. In addition there will be a reduced dependence on foreign oil and the associated economic stability that may bring through reduced economic risks of the global energy market as well as increase in dollars kept instate.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There are no technical barriers to implementation.
- b. *Economic*: Changing the speed limit signs is not expensive. No data are available on whether additional law enforcement officers would be needed to implement the program, but additional tickets could bring in necessary revenue.
- c. *Statutory/Regulatory*: This would require legislation.

³ Assumes that a reduction in *average* highway speed from 70 to 65 would result in an 8.2% increase in fuel efficiency applied to highway miles assumed to be 40% of the total Vehicle Miles Traveled (VMT) annually in New Hampshire.

⁴ Assumes that a reduction in *average* highway speed from 70 to 55 would result in an 17.1% increase in fuel efficiency applied to highway miles assumed to be 40% of the total Vehicle Miles Traveled (VMT) annually in New Hampshire.

- d. *Social*: It might be difficult to get the public to buy into reduced speed limits – this action could be perceived as infringing on personal freedoms.
5. Other Factors of Note: This could be combined with other programs such as allowing buses to travel at higher speeds which would help encourage commuters to use public transit. Emissions of nitrogen oxide, the primary pre-cursor pollutant to ground level ozone (smog) formation, also increase at speeds above 48 mph.
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
- <http://www.t2.unh.edu/fall04/pg6.html>
 - <http://drive55.org/content/view/18/5/>
 - http://www1.eere.energy.gov/vehiclesandfuels/facts/favorites/fcvt_fotw222.html

TLU Action 1.D.2 – Address Vehicle Idling

Summary

Vehicle idling wastes fuel, damages engines, and results in excessive greenhouse gas and criteria air pollutant emissions. For example, overnight idling associated with long-haul trucking is estimated to consume 5 to 7 percent of all fuel used by heavy trucks. To address this issue, New Hampshire should implement a robust idling reduction program that affects all vehicles but, more specifically, sets idling reduction targets of 80 percent by 2010 and 100 percent by 2020 for heavy trucks. The proposed program would utilize a variety of approaches, including regulations, incentives for retrofits, and educational outreach to reduce idling times among all vehicle types across the state. The state could adopt regulations and provide outreach to eliminate all idling in light cars and trucks when conditions do not dictate the activity. For the trucking industry, recent developments in truck stop electrification (TSE) technology have improved available options for truck drivers to operate on-board systems without running their engines while parked.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

Options for an anti-idling program for cars and light-duty vehicles include public education, fines for idling infractions, and targeted enforcement in certain areas or locations.

An anti-idling program for heavy duty vehicles would include outreach and fines based on vehicle type. However, truckers sometimes need to run their engines to maintain comfortable conditions inside their cabins during required breaks and/or to keep refrigerated cargo cold. Reducing the need for idling would require direct modifications of the existing truck fleet and/or rest stops. Incentives or loans would be required to accomplish the necessary retrofits.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

- a. *Method of Establishment (e.g., legislation, executive order)*: Legislation leading to anti-idling regulations would be required, and state agencies would be tasked with developing and enforcing those regulations and implementing education and outreach programs.
- b. *Resources Required*: Funding for additional staff to run retrofit loan or incentive programs for rest stops and trucks and for enforcement for light-duty vehicle regulations.
- c. *Barriers to Address (especially for medium to low feasibility actions)*: The identification of funding sources.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation*: NHDES would be required to develop regulations. Enforcement would fall to a variety of state and local entities depending on the target.
- b. *Parties Paying for Implementation*: State and local entities responsible for enforcement would bear the costs of implementation.
- c. *Parties Benefiting from Implementation*: Economic benefits would be accrued by fleet managers, owner-operators, and individual car owners. Society as a whole benefit from improved air quality and better health.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Heavy-duty fleet retrofits that affect vehicle fuel economy.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

- a. *Existing:* New Hampshire Code of Administrative Rules Env-A 1101.05, *Diesel and Gasoline-Powered Motor Vehicles*
- b. *Proposed:*
 - TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
 - TLU Action 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
 - TLU Action 1.C.1 – Adopt a Low Carbon Fuel Standard

6. Timeframe for Implementation: Immediate

7. Anticipated Timeframe of Outcome: Immediate for light-duty vehicles with increased emission reduction as impacts of outreach and enforcement take hold. For the freight haulers, the outcome would still occur in the short-term but would be delayed due to the time that would need to be provided to comply with mandated retrofits or for the incentives to lead to the retrofits.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- a. Short-term (2012): 0.01 MMTCO₂e/year
- b. Medium-term (2025): 0.02 MMTCO₂e/year
- c. Long-term (2050): 0.03 MMTCO₂e/year

2. Economic Effects:

a. Costs:

- i. Implementation Cost: Low
- ii. Timing: Constant / even
- iii. Impacts: Business – evenly distributed

b. Savings:

- i. Potential Economic Benefit: Moderately low
- ii. Timing: Constant / even
- iii. Impacts: Business – evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental:* This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social:* There should be a net cost reduction due to greater overall fuel economy and lower long-term health care costs.
- d. *Other:* This measure will lead to reduced wear and tear on the engine and exhaust systems reduce operating and maintenance costs.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical:* The technology required to implement this action is available and can be implemented immediately.

- b. *Economic*: As fuel prices, especially diesel fuel used in heavy duty vehicles, continue to be elevated or even rise further, the economic benefits of idling reduction will act as an incentive to comply with new or more strictly enforced regulations.
- c. *Statutory/Regulatory*: There are existing regulations in NH (Env-A 1101.05) that specify the maximum idling time under specific environmental conditions and provide the basis for this action.
- d. *Social*: While there may be some resistance to turn vehicles on and off while waiting, the combined health and economic benefits of the practice will serve as leverage to reduce that resistance.

5. Other Factors of Note:

6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the near-term (i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector).

7. References:

TLU Action 1.D.3 – Improve Traffic Flow

Summary

Revise state and regional guidance and policies to promote the use of appropriate measures to reduce congestion, improve traffic flow, and reducing GHG emissions associated with vehicle travel. Practical measures could include: 1) modern roundabouts at intersections, 2) synchronization of signalized intersections, and 3) reduction of access points through improved access management.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
 - a. Modern roundabouts: When an intersection is considered for reconstruction, the modern roundabout should be evaluated as a possible solution to improve the efficiency of the design. New Hampshire Department of Transportation uses this approach in their project development process. If a roundabout is determined to be a viable option, it is brought forward and presented to the public for further consideration. Whether a roundabout or signal is constructed is currently left to the public decision-making process. Educating the public on the environmental benefits of roundabouts would lead to greater acceptance of this design approach. A public policy requiring the use of roundabouts when shown to be appropriate for a given location (in preference to traffic signals) could be implemented to promote more widespread use of roundabouts in New Hampshire.
 - b. Synchronization of signalized intersections: This process looks to optimize signal timing through a series of signalized intersections by interconnecting and coordinating the traffic signals along a corridor. Previous projects in New Hampshire have reduced vehicle delays by 16 percent and vehicle stops by 10 percent. NHDOT is currently undertaking a project to study and apply optimization techniques to 34 intersections in the Nashua Regional Planning Commission area.
 - c. Access management: When existing highway corridors are improved by state, municipal, or private developments, access management principles should be incorporated. Intersections or roundabouts should be adequately spaced to allow proper turn movements and queue lengths. Proper spacing of intersections is also necessary to allow synchronization and coordination as described above. Private drive access to corridors must also be managed with the intent of limiting the number of individual drive access points. Private driveways should be combined by the use of frontage roads or access easements and directed to designated roundabouts or intersections.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: NHDOT and municipalities have control of intersection design and coordination. Access management principles can be encouraged as part of the permitting process. New projects would be proposed through the public participation process and, upon acceptance, move forward through the funding and project development process.
 - b. *Resources Required*: Additional education efforts regarding the benefits of modern roundabouts and access management principles. Funding would be required for intersection upgrades and traffic signal coordination projects.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Acceptance of roundabouts instead of signals by the public, municipalities, and developers of commercial and retail property.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: NHDOT, municipalities, private developments.
 - b. *Parties Paying for Implementation*: Current funding sources, 10-Year Plan, local funding, private funding.
 - c. *Parties Benefiting from Implementation*: The traveling public.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
 - a. Current NH DOT policy is to analyze a roundabout at any location where a traffic signal is proposed to see whether this design approach is a viable intersection control option.
 - b. The NHDOT is pursuing a project with CMAQ funding to study and optimize the operation of 34 intersections in the Nashua Regional Planning Commission area. This project should take 18 months to complete and is scheduled to begin in 2008.
 - c. Access management is part of the design process at the state level. Additional educational efforts to promote access management should be provided to municipalities and the development community.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*: NHDOT currently considers modern roundabouts at all intersection locations.
 - b. *Proposed*: NHDOT, traffic signal synchronization project.
6. Timeframe for Implementation: On average, intersection/signal coordination projects require 2 to 3 years to design, approve, and construct. On average, 4 to 5 traffic signalization projects on state roads are constructed each year. Most new signalized intersections are the result of new commercial development projects.
7. Anticipated Timeframe of Outcome: 2010 and thereafter.

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.01 MMTCO₂e/year
 - b. Medium-term (2025): 0.04 MMTCO₂e/year
 - c. Long-term (2050): 0.06 MMTCO₂e/year
2. Economic:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Moderately low
 - ii. Timing: Low short-term / mostly long-term
 - iii. Impacts: Evenly distributed
3. Other Benefits/Impacts:
 - a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: This action will lead to less vehicle delay and faster travel times for the traveling public
 - d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*): This action has a high potential for implementation.
 - a. *Technical*: The technical resources and expertise required to implement these actions already exist and are in place at the State level and in the highway consultant industry. Additional training should be provided to promote the benefits. Not many technical challenges exist.
 - b. *Economic*: These actions would compete with traditional and existing options for funding, 10YP, municipal funding, and private funding. No new funding mechanisms required.
 - c. *Statutory/Regulatory*: No new statutory or regulatory requirements are needed.
 - d. *Social*: An educational effort of the public is required to ensure public support since the installation of roundabouts in some communities has been difficult in the past.
5. Other Factors of Note: N/A
6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the near-term (*i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector*)
7. References:
 - Srinivas Mandavilli, Eugene Russell, and Margaret J. Rys, “Impact of Modern Roundabouts on Vehicular Emissions,” Mid-continent Transportation Research Symposium, Ames, Iowa, August 2003.
 - NHDOT Traffic Signal Optimization project description, 2005-2006 Congestion Mitigation and Air Quality Application Summary and Ranking, 2005.

TLU Action 1.D.4 – Reduce Emissions through Enhanced Vehicle Inspection Programs

Summary

Improve motor vehicle operations, and thus vehicle fuel efficiency, through continuation of existing vehicle Inspection and Maintenance (I/M) programs, including on-board diagnostics (OBD) for light-duty vehicles. Also, expand implementation of more stringent I/M programs for medium- and heavy-duty vehicles, including OBD inspections for these vehicles when national standards are established. A well maintained vehicle operates as a more fuel-efficient and less polluting one.

Specifically,

- Continue the on-board diagnostics motor vehicle inspection program for light-duty/passenger vehicles (LDV) and expand the program to include heavier vehicles up to 10,000 pounds (11,000 would be consistent with New Hampshire's vehicle lemon law).
- Upon issuance of federal standards requiring OBD systems for medium-duty (8,500-14,000 lbs) and heavy-duty (>14,000 lbs) vehicles, implement a statewide testing program for these vehicles.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Expand and revise current emission inspection process and start advisory program for heavier-weight/heavier-duty vehicles.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. Method of Establishment (e.g., legislation, executive order): Legislation.
 - b. Resources Required: Network of stations/inspectors exist. State (DOS/DMV) would have to expand program with contracted vendor for program management (Gordon-Darby) and there would be a need for program outreach to citizens.
 - c. Barriers to Address (especially for medium to low feasibility actions): Public acceptance of impacts on small businesses.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. Parties Responsible for Implementation: NH Department of Safety, Division of Motor Vehicles, and Department of Environmental Services.
 - b. Parties Paying for Implementation: DOS/DMV, state inspection stations, customers .
 - c. Parties Benefiting from Implementation: Citizens, vehicle owners.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): New Hampshire's Enhanced Safety Inspection and OBD Program (the annual safety and emission control equipment inspection for LDV).
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. Existing: Federal fuel economy and vehicle certification standards.
 - b. Proposed:
 - TLU Action 1.A.1 – Support Stricter Corporate Average Fuel Economy Standards
 - TLU Action 1.A.2 – Support Fuel Economy Standards for Heavy-Duty Vehicles
 - TLU Action 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
6. Timeframe for Implementation:
 - a. For light-duty vehicles: Immediate.

- b. Medium-duty vehicles are required to have OBD systems beginning with the 2008 model year, so this program could be implemented immediately. OBD is not yet required for heavy-duty vehicles.
7. Anticipated Timeframe of Outcome:
- a. For light-duty vehicles: Immediate.
 - b. Requirements for heavier vehicles should have an impact by about 2012 to 2015.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- a. Short-term (2012): 0.03 MMTCO₂e/year
- b. Medium-term (2025): 0.09 MMTCO₂e/year
- c. Long-term (2050): 0.12 MMTCO₂e/year

2. Economic Effects:

- a. Costs:
 - i. Implementation Cost: Moderately low
 - ii. Timing: Constant / even
 - iii. Impacts: Evenly distributed
- b. Savings:
 - i. Potential Economic Benefit: Low
 - ii. Timing: Constant / even
 - iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: This measure will create an another burden/disincentive for citizens driving larger and heavier vehicles increasing the chance that they will switch to more efficient vehicles.
- d. *Safety*: There will also be more safety inspected vehicles on road.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Minimal technical challenges and easy implementation for all vehicle classes.
- b. *Economic*: OBD framework and systems are already in place at all state-approved inspection stations, so there would be no cost to them and the potential for increased revenue. Owners of light-duty and medium-duty vehicles could be faced with vehicle repairs they have not had to undertake before.
- c. *Statutory/Regulatory*:
 - For light-duty vehicles: Very feasible – state framework already exists.
 - Moderately feasible for larger vehicles. Implementation for medium-duty vehicles would require legislative action, and implementation for heavy-duty vehicles would require federal action.
- d. *Social*: This may have economic impacts on the smaller commercial businesses that typically use larger light-duty vehicles (SUVs and PUs) and smaller heavy-duty vehicles. Current infrastructure exists for

OBD testing, making program implementation easy to achieve to. Acceptance by vehicle inspection stations is not anticipated to be a problem. The general public may have concerns with the impacts on small businesses. The general public would benefit from any emission reductions realized..

5. Other Factors of Note:

6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the near-term (i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector)

7. References:

- NH Employment Security, “Vital Signs 2008: Economic & Social Indicators for NH 03-06.” There are an estimated 60,000-90,000 medium-duty vehicles; 1.2 million registered passenger vehicles; and 205,000 commercial vehicles in New Hampshire.
- Average vehicle occupancy is 1.1 persons per passenger car.

TLU Action 2.A.1 – Implement a Commuter Trip Reduction Initiative

Summary

Establish a state-supported initiative to increase the number of employers implementing commuter trip reduction programs. These programs use a variety of strategies – including parking “cash-out,” car/vanpooling, flex time, and telecommuting – to increase the use of commute and work options that contribute less to greenhouse gas emissions than travel by single-occupancy vehicles (SOV). The state initiative would employ a variety of mechanisms, which could include targeted education and outreach, awards and recognition, and business tax incentives. This action could be implemented as part of supporting regional transportation management associations (TLU Action 2.B.2.f).

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Provide resources, marketing, and potentially financial (tax) incentives for companies that implement commute trip reduction programs. Possible elements of such a program include:
 - a. Parking cash-out: Assigns a monetary value to the employee benefit of free parking and more fairly subsidizes employees’ use of alternative commuting modes. Basic idea: it costs businesses money to provide free parking to employees who commute in SOVs. When what is effectively an employee benefit is given a cash value that can be accrued by employees (*i.e.*, cash allowance in lieu of a parking space), employees are motivated to accept the money and explore other commuting options – even if they employ them only 1 or 2 days a week.
 - b. Flexible or compressed work schedules: Flexible schedules allow for alternative start/end times to provide better coordination with transit or carpool schedules. Compressed work weeks – *e.g.*, four 10-hour days instead of five 8-hour days – could eliminate one commuting trip per week.
 - c. Telecommuting/satellite offices: Allow workers to work from home, or from a satellite office that is closer to home, to reduce travel required.
 - d. Incentives: Priority parking for carpools and guaranteed ride home programs for carpool/transit users are just two examples of possible incentives that workplaces can provide to reduce total vehicle miles traveled.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Employer-driven with support from state and local transportation entities (resources, information, marketing)
 - b. *Resources Required*: Redistribution of resources by employers. State expenditures on staffing and materials to develop informational resources and market the program. Could also involve tax credits for participating businesses (to encourage greater participation and performance).
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Program implementation by employers. Lack of effective alternative travel options (*e.g.*, no/minimal bus service).
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Employers and employees; other commuters
 - b. *Parties Paying for Implementation*: Employers (with potential support from state or local entities through tax or zoning incentives).
 - c. *Parties Benefiting from Implementation*: All commuters; adopting employees.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Existing transit, rideshare, and workplace programs (vary by workplace).

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

- a. *Existing:*
- b. *Proposed:* Actions that increase the cost of driving alone:
 - TLU Action 2.A.2 – Implement Congestion Pricing (*cross-referenced as TLU Action 1.D.5*)
 - TLU Action 2.A.3 – Create a VMT-Based Insurance Premium Structure
 - TLU Action 2.A.4 – Implement VMT-Based Registration Fees
 - TLU Action 2.A.5 – Increase the State Gasoline Tax
 - TLU Action 2.A.6 – Apply a Surcharge to High Carbon Fuels
 - TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking

Actions that increase the availability of public transportation and/or housing in closer proximity to work places (see variety of actions under categories 2B and 2C).

6. Timeframe for Implementation: Could be implemented almost immediately, although it would vary depending on the extent of current employer programs to foster alternative modes. Leading employers could be strong models for implementation by others, particularly with the benefit of public education efforts at the state and local level.

7. Anticipated Timeframe of Outcome: 2009 and beyond.

Program Evaluation

1. Estimated CO₂ Emission Reduction: ANALYSIS UNDERWAY

- a. Short-term (2012): 0.03 MMTCO₂e/year
- b. Medium-term (2025): 0.13 MMTCO₂e/year
- c. Long-term (2050): 0.17 MMTCO₂e/year

2. Economic Effects:

- a. Costs:
 - i. Implementation Cost: Moderately low
 - ii. Timing: Constant / even
 - iii. Impacted: Business
- b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism; not individually quantifiable
 - ii. Timing:
 - iii. Impacted: Consumer – evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental:* This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social:* Non-SOV transportation creates community and workplace communication opportunities that might not otherwise exist.
- d. *Other:* CTR largely relies on redistribution of funds. Employers have an incentive to offer programs because they will either pay (or negotiate) lower leases because of reduced parking demand, or they will

spend less money on owned real estate that can only be used for parking (wiser use of real estate because of lower parking requirements). No one "pays" – everyone wins.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*): This action has a high potential for implementation.
 - a. *Technical*: The infrastructure is already in place to implement CTR programs. Many key elements already exist. The only challenge exists in promoting and coordinating them. CTR solutions would strongly benefit from increased transit options.
 - b. *Economic*: There are no major economic barriers here as implementation takes the form of a redistribution of resources already being spent. It has high appeal from an economic standpoint because employees not currently benefiting from their commute choices have an opportunity to do so.
 - c. *Statutory/Regulatory*: Legislation not necessary.
 - d. *Social*: An effectively promoted program with the benefit of a number of high-profile early-adopting companies should have a strong positive impact on individuals and workplaces. Employees of companies in NH meeting minimum size threshold. Benefits realized immediately upon voluntarily entering an employer's program. Financial benefits to employers would be realized over a longer term. Those who commute to work using non-SOV modes more fairly receive financial benefits from their choices. Ultimately, widely available cash-out program could reduce parking requirements and parking lot size, which could reduce impervious surfaces in urbanized areas benefited stormwater management efforts and water quality.
5. Other Factors of Note: Direct impact on NH GHG emissions depends on number of employers statewide that would meet the minimum employee threshold and impact would only be on commute trips. Cost to implement would be low with financial benefit accruing to individuals for their actions and to businesses in terms of reduced parking requirement burden. Parking cash-out uses the right market-based instruments to motivate behavior and demonstrate action and leadership by the private sector, public sector, and the individual.
6. Level of Group Interest: High – the working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
 - <http://righg.raabassociates.org/Articles/GHGPlanBody7-19-02FINAL.pdf> (p 23)
 - <http://www.tc.gc.ca/programs/environment/utsp/TDM/prj73e.htm>
 - Shoup, David. "Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies." Paper published earlier as a program evaluation report for the California Air Resources Board. Transport Policy 4, no. 4 (1997): 201-216.
 - Shoup, David. "An Opportunity to Reduce Minimum Parking Requirements." Journal of the American Planning Association 61, no. 1 (1995): 14-28. Cited in Shoup (1997)
 - http://www.climateactionprogramme.org/features/article/transportation_and_greenhouse_gas_mitigation
 - www.uctc.net/access/access13.pdf
 - www.vtpi.org/wwclimate.pdf

TLU Action 2.A.2 – Implement Congestion Pricing *(cross-referenced as TLU Action 1.D.5)*

Summary

Implement congestion pricing on major highways in southern New Hampshire. Congestion pricing discourages highway use during peak hours of highway travel by increasing toll rates for single-occupant vehicles at these times. This action could reduce carbon emissions in two ways: 1) by shifting discretionary rush-hour highway travel to off-peak periods, resulting in more efficient traffic flow; and 2) by making other transportation modes, such as public transit or carpools, more attractive as an alternative to single-occupant vehicles because of the cost penalty associated with the latter. Reduced or free access could also be provided for high-occupancy vehicles (HOVs) during peak periods. Funds raised by increasing tolls during peak periods could be directed toward development/expansion or subsidization of public transit systems through appropriate legislation.

Program Description

1. Mechanism *(i.e., how the policy or program achieves the desired result)*:

Congestion pricing has been used in many other areas of the country as part of toll pricing scenarios. On the New Jersey Turnpike, toll rates are approximately 25 percent higher during peak weekday hours. Toronto's 407ETR also utilizes congestion pricing, a sample of toll rates showed an increase of approximately 7.1 percent during peak hours. High-occupancy vehicles (HOV's) on both of the above systems are required to pay the same toll as other travelers. On the NJ Turnpike, hybrid single-occupancy vehicles (SOVs) are permitted to travel in HOV lanes.

Congestion pricing in New Hampshire was attempted between August 1995 and August 1997 on the FE Everett Turnpike, in Bedford. The "3 for free" program allowed vehicles with 3 or more occupants to travel toll-free through the Bedford toll plaza. The program on average recorded 2.5 percent HOV use that resulted in 455 HOV's per day.

A congestion-pricing program requires a toll collection system. In New Hampshire, tolls are collected on the Central Turnpike, in Bedford and Hooksett, and on the Eastern Turnpike, in Hampton, Dover, and Rochester. The previous "3 for free" program provided an incentive for HOV use but did not penalize SOV use. It would seem that a congestion-pricing program that provided both an incentive for HOV use and a disincentive for SOV use would be more effective in reducing vehicle miles traveled. Such a system could reduce congestion by varying toll rates in an effort to shift discretionary travel to off-peak periods. Also, alternative toll lanes would be set up to provide free or reduced-rate access for HOV's.

A similar program could be implemented on the I-93 corridor if a toll station were constructed there. Because of the current lack of toll booths, such a program on I-93 would have far greater initial costs in comparison with initial program costs on the existing turnpike system. It is estimated that a new toll facility on I-93 would cost 42 million dollars. Approximately 42 million vehicles travel on I-93 annually. Therefore, a 1 dollar toll for passenger cars would raise sufficient revenue in the first year to cover construction costs.

2. Implementation Plan *(i.e., how to implement the specific policy or program)*:

a. Method of Establishment *(e.g., legislation, executive order)*:

- G & C approval to modify toll rates/times.
- Legislation required if increased toll revenue is to be shifted toward development/expansion or subsidization of public transit systems.
- (I-93 option only) Legislation to establish new tolls.
- (I-93 option only) Environmental permitting for construction of new toll facilities.
- (I-93 option only) Federal Highway Administration approval if new toll facilities were added on the federal highway system.

b. *Resources Required:*

- Additional funding to modify tolls and provide signing for HOV identification, estimated at \$100, 000.
- Additional personnel to operate and manage the congestion pricing facility.
- Funding for new toll station construction estimated at \$42 million (I-93 option only).

c. *Barriers to Address (especially for medium to low feasibility actions):* Minimal barriers

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

- a. *Parties Responsible for Implementation:* NHDOT/Safety
- b. *Parties Paying for Implementation:* NHDOT Turnpike authority, via tolls, gas taxes, NH Highway fund.
- c. *Parties Benefiting from Implementation:* Traveling public, transit riders, HOV riders. Most vacation travelers would probably not be effected by this action because they usually travel in HOVs.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

- a. *Existing:* Existing park-and-ride facilities
- b. *Proposed:*
 - Future park-and-ride facilities
 - TLU Actions 2.A.1 and 2.A.7, and all of TLU Goal 2B (Congestion pricing encourages modes of travel other than SOVs.)

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

- a. *Existing:* None
- b. *Proposed:* TLU Action 2.B.2.d – Implement Recommendations of the I-93 Transit Investment Study

6. Timeframe for Implementation: Congestion pricing on the existing turnpike facility could be implemented in 6 to 12 months. I-93 implementation would involve approval and construction time, estimated at 5 years or more.

7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- a. Short-term (2012): 0.03 MMTCO₂e/year
- b. Medium-term (2025): 0.03 MMTCO₂e/year
- c. Long-term (2050): 0.04 MMTCO₂e/year

2. Economic Effects:

a. Costs:

- i. Implementation Cost: Moderate
- ii. Timing: Immediate / higher initial cost
- iii. Impact: Evenly distributed

b. Savings:

- i. Potential Economic Benefit: Supporting mechanism; not individually quantifiable
- ii. Timing:
- iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Higher toll rates would have greater impacts on individuals at lower income levels, particularly if few other transit oriented travel alternatives exist.

This action would create more efficient use of the transportation infrastructure by encouraging discretionary drivers to use the facility during off peak periods, thereby increasing the level of service of the facility and increasing vehicle throughput.

- d. *Other*

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There will be minimal technical challenges.
- b. *Economic*: There will be minimal cost for implementation on the existing turnpike system.
- c. *Statutory/Regulatory*: There will be minimal regulatory issues on the existing turnpike system, requiring G & C approval only. The I-93 option will require new toll facilities, which will most likely be seen as new taxes, and have issues surrounding it..
- d. *Social*: Few transit options presently exist for commuters who must travel at peak hours.

5. Other Factors of Note:

- 6. *Level of Group Interest*: Moderate. The working group considered this a supporting action to undertake in the mid-term (*i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector*).

7. References:

TLU Action 2.A.3 – Create a VMT-Based Insurance Premium Structure

Summary

Create an incentive for consumers to drive less to reduce the cost of vehicle insurance. Some portion of the annual insurance premium would be based on the vehicle miles traveled (VMT) above a standard minimum (e.g., 12,000 miles per year). Consumers would have an incentive to reduce their VMT by making more efficient travel decisions and location choices, e.g., living closer to work and services. Mileage data could be collected in many ways. The cheapest would be for motorists to submit odometer readings, verified with occasional spot-checks. The most costly would be to install GPS transponders in each participating vehicle. An intermediate approach would be to certify vehicle service businesses (garages, oil change shops, and perhaps some insurance brokers) to perform odometer audits. Governments could certify these auditors and collect odometer readings in vehicle registration databases. Current insurance pricing practices use miles driven as a pricing factor in the premiums they charge. However, a limited study (93 participants) by Progressive Insurance Co. performed in Oregon, Minnesota, and Michigan found a 10 percent reduction in VMT for motorists choosing VMT-based insurance policies.⁵

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Some portion of the annual insurance premium would be based on the vehicle miles traveled (VMT), thus giving consumers an incentive to make more efficient travel decisions and location choices (e.g., living closer to work and services) to reduce their VMT. Verification of actual miles driven would be required. Pilot programs have been tried in several areas within the U.S. and abroad. In Oregon, insurance companies receive a tax credit (\$100) for each vehicle covered by a mileage-based policy.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: State government would work with vehicle insurance companies to identify any necessary legislation to allow companies to offer this option.
 - b. *Resources Required*:
 - c. *Barriers to Address*: Participation by insurance companies.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Insurance companies and state facilities.
 - b. *Parties Paying for Implementation*: Vehicle owners
 - c. *Parties Benefiting from Implementation*: Vehicle owners who drive fewer miles per year than average motorists.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*: Currently insurance policy pricing is scaled by how much one drives but is not based on actual odometer readings and is not, in many cases, a significant factor in setting an insured's rate.
 - b. *Proposed*: other mechanisms that increase the price of additional VMT (greater total increase in cost of driving will produce greater shifts in driving behavior resulting in greater VMT reduction):
 - TLU Action 2.A.2 – Implement Congestion Pricing (*cross-referenced as TLU Action 1.D.5*)
 - TLU Action 2.A.4 – Implement VMT-Based Registration Fees
 - TLU Action 2.A.5 – Increase the State Gasoline Tax

⁵ Pay-As-You-Drive Vehicle Insurance: Converting Vehicle Insurance Premiums Into Use-Based Charges TDM Encyclopedia, Victoria Transport Policy Institute, <http://www.vtpi.org/tadm/tadm79.htm>

TLU Action 2.A.6 – Apply a Surcharge to High Carbon Fuels
 TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking

6. Timeframe for Implementation: Would likely take a year of working with insurance companies to implement.
7. Anticipated Timeframe of Outcome: Would expect to see near-term changes in VMT, which might increase over time as people make alternative home-work location choices.

Program Evaluation

1. Estimated CO₂ Emission Reduction:

Action to Implement	CO ₂ Emission Reductions (MMTCO ₂ e)		
	2012	2025	2050
2.7% reduction in total light duty VMT	0.15	0.16	0.22
5% reduction in total light duty VMT	0.28	0.30	0.41
7% reduction in total light duty VMT	0.39	0.42	0.57

2. Economic Effects:

- a. Costs:

- i. Implementation Cost: Moderately low
- ii. Timing: Constant / even
- iii. Impacts: Evenly distributed

- b. Savings:

- i. Potential Economic Benefit: Moderately high
- ii. Timing: Low short-term / mostly long-term
- iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Current vehicle insurance pricing tends to overcharge motorists who drive their vehicles less than the average amount each year, and undercharges those who drive more than the average amount, within each price class (Edlin, 2003; Litman, 2001).⁶

Since lower-income motorists drive their vehicles significantly less on average than higher-income motorists, this pricing structure is regressive.⁷ There is, however, some concern that by increasing the cost of vehicle ownership and use, this measure – depending on the premium structure – could adversely

⁶ Pay-As-You-Drive Vehicle Insurance: Converting Vehicle Insurance Premiums Into Use-Based Charges TDM Encyclopedia, Victoria Transport Policy Institute, <http://www.vtpi.org/tdm/tdm79.htm>

⁷ Jason E. **Bordoff** (2008) *Pay-As-You-Drive Car Insurance*, Brookings Institution (www.brookings.edu/articles/2008/spring_car_insurance_bordoff.aspx).

affect individuals who cannot, or choose not to, use public transportation, or who otherwise cannot reduce their VMT.

d. *Other:*

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical:* There are no technical barriers or challenges to implementing this measure.
- b. *Economic:* This measure will have economic impacts on individual consumers, though those impacts may be reduced for many as a result of behavior modification/reduced VMT.
- c. *Statutory/Regulatory:*
- d. *Social:* There would be social resistance as this would be perceived to increase costs.

5. Other Factors of Note: None

6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the mid-term, as an additional incentive mechanism once other actions to provide alternative travel and location options through compact development were in place (*i.e., this action supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector*).

7. References:

TLU Action 2.A.4 – Implement VMT-Based Vehicle Registration Fees

Summary

Create an incentive for consumers to drive less to reduce the cost of vehicle registration. Some portion (or all) of the annual vehicle registration fee would be based on the vehicle miles traveled (VMT) in the previous year above a standard minimum (e.g., 10,000 miles per year). VMT would be determined by an odometer-reading performed with the annual inspection. Consumers would have an incentive to reduce their VMT by making more efficient travel decisions and location choices, e.g., living closer to work and services.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Some portion of the annual vehicle registration fee would be based on the vehicle miles traveled (VMT) in the previous year above a standard minimum (e.g., 10,000 miles per year), thus giving consumers an incentive to make more efficient travel decisions and location choices (e.g., living closer to work and services) and reduce VMT
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. Method of Establishment (*e.g., legislation, executive order*): State government – legislation
 - b. Resources Required: Resources to revise current vehicle registration procedures and materials.
 - c. Barriers to Address (*especially for medium to low feasibility actions*): Potential equity impacts due to relatively higher impact on low-income and rural drivers, and those unable (or unwilling) to reduce VMT.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. Parties Responsible for Implementation: State government
 - b. Parties Paying for Implementation: Car owners
 - c. Parties Benefiting from Implementation: If revenue-generating (versus revenue-neutral), additional funds collected could be directed to GHG-reducing transportation investments (e.g., public transportation)
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. Existing:
 - b. Proposed: Other mechanisms that increase the price of additional VMT (greater total increase in cost of driving will produce greater shifts in driving behavior resulting in greater VMT reduction):
 - TLU Action 2.A.2 – Implement Congestion Pricing (*cross-referenced as TLU Action 1.D.5*)
 - TLU Action 2.A.3 – Create a VMT-Based Insurance Premium Structure
 - TLU Action 2.A.5 – Increase the State Gasoline Tax
 - TLU Action 2.A.6 – Apply a Surcharge to High Carbon Fuels
 - TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking
6. Timeframe for Implementation: It would likely take a year or two to develop vehicle registration policies to implement this program.
7. Anticipated Timeframe of Outcome: Would expect to see near-term changes in VMT, which might increase over time as people make alternative home-work location choices.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

Action to Implement	CO ₂ Emission Reductions (MMTCO ₂ e)		
	2012	2025	2050
2.7% reduction in total light duty VMT	0.15	0.16	0.22
5% reduction in total light duty VMT	0.28	0.30	0.41
7% reduction in total light duty VMT	0.39	0.42	0.57

2. Economic Effects:

a. Costs:

- i. Implementation Cost: Low
- ii. Timing: Constant / even
- iii. Impacts: State government

b. Savings:

- i. Potential Economic Benefit: Supporting mechanism; not individually quantifiable
- ii. Timing:
- iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend. In addition, there would be reduced noise pollution as well.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: By increasing the cost of vehicle ownership and use, this measure – depending on the premium structure – could adversely affect individuals who cannot, or choose not to, use public transportation, or who otherwise cannot reduce their VMT. However, those who drive very little could see a reduced vehicle registration cost that more accurately reflects their impact on the transportation system.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There are no technical barriers or challenges to implementing this measure.
- b. *Economic*: This measure will have economic impacts on individual consumers, though those impacts may be reduced for many as a result of behavior modification/reduced VMT.
- c. *Statutory/Regulatory*:
- d. *Social*: There would be social resistance to the increased costs, especially without alternative transportation modes.

5. Other Factors of Note: None

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the mid-term to achieve significant reductions in CO₂ emissions from the transportation and land use sector (implemented once other actions to provide alternative travel and location options through compact development were in place).

7. References:

Draft

TLU Action 2.A.5 – Increase the State Gasoline Tax

Summary

Increase New Hampshire's gasoline tax (and consequently the price of gasoline) by a substantial amount – on the order of \$1 to 2 per gallon – to increase the cost of driving and encourage behavior modifications to reduce vehicle miles traveled (VMT). Such modifications could take the form of fewer trips, shorter trips, and increased use of carpooling and public transportation. The current gasoline tax of \$0.18 per gallon is not indexed to inflation and has not been changed since 1991.

Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* An increase in the gasoline tax would make driving more expensive and be a disincentive for excessive, unnecessary, and inefficient travel. A higher gas tax would also serve as a way to capture the true social, economic, and environmental costs of over-reliance on single-occupant vehicles and increasing per capita VMT. A substantial increase in the gas tax would be required to produce the desired level of VMT reductions that could occur from changes in driver behavior and choice of home/work locations.
2. *Implementation Plan (i.e., how to implement the specific policy or program):*
 - a. *Method of Establishment (e.g., legislation, executive order):* Legislative amendment of RSA 260:32.
 - b. *Resources Required:* Analysis to determine appropriate gasoline tax to promote behavior modification and thereby reduce VMT (and to achieve other co-benefits discussed below); possible state staff support for legislative action.
 - c. *Barriers to Address (especially for medium to low feasibility actions):* Political
3. *Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):*
 - a. *Parties Responsible for Implementation:* Legislature
 - b. *Parties Paying for Implementation:* Consumers of gasoline
 - c. *Parties Benefiting from Implementation:* All of New Hampshire, as a result of reduced GHGs, reduced VMT, reduced demands on highway infrastructure, and increased revenues to maintain existing roads and bridge infrastructure.
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):* None.
5. *Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):*
 - a. *Existing:* This action will generate additional, much-needed revenues to fix and maintain existing roads and bridges, thereby avoiding the GHG impacts associated with major overhauls required by deferred maintenance.
 - b. *Proposed:* This action will generate additional revenues which, with the amendment of Article 6-a of the N.H. Constitution (see TLU 2B2c), would provide much-needed funding support for public transportation. Enhanced public transportation would provide greater opportunity for behavior modification that reduces VMT and GHG emissions.
6. *Timeframe for Implementation:* Timeframe for implementation will be tied to the legislative process.
7. *Anticipated Timeframe of Outcome:* Behavior changes would be expected immediately, with the potential for greater reductions in travel over the long-term as people make alternative location choices regarding where they live and work to reduce travel costs.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- a. Short-term (2012): 0.22 MMTCO₂e/year
- b. Medium-term (2025): 0.67 MMTCO₂e/year
- c. Long-term (2050): 1.47 MMTCO₂e/year

2. Economic Effects:

a. Costs:

- i. Implementation Cost: High
- ii. Timing: Constant / even
- iii. Impacts: Evenly distributed

b. Savings:

- i. Potential Economic Benefit: Very high
- ii. Timing: Constant / even
- iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend. In addition, there would be reduced noise pollution as well. If, however, enhanced revenues were used to support expansion and construction of new roads, these benefits could be lost and VMT and associated GHGs could actually increase.
- b. *Health*: Reduced Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Enhanced revenues will help the State implement a “fix it first” policy of fixing and maintaining existing roads and bridges. With amendment of Article 6-a of the Constitution, these enhanced revenues also could help support public transit, thereby providing greater transportation choice and helping to meet the needs of the growing elderly population and individuals who cannot afford a personal vehicle. By increasing the cost of gasoline, this measure may – depending on the size of the gas-tax increase – adversely affect individuals who cannot, or choose not to, use public transportation, or who otherwise cannot reduce their VMT.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: There are no technical barriers or challenges to implementing this measure.
- b. *Economic*: This measure will have economic impacts on individual consumers of gasoline, though those impacts may be reduced for many as a result of behavior modification/reduced VMT. This measure will create economic opportunities for the State by generating additional, much-needed revenues to fix and maintain existing roads and bridges.
- c. *Statutory/Regulatory*: Increasing the gasoline tax will involve political challenges
- d. *Social*: There would be social resistance to increasing the gas tax

5. Other Factors of Note:

6. Level of Group Interest: Low. The working group, recognizing the political infeasibility of increasing the gas tax enough to have a significant impact on driving behavior (on the order of \$1 to \$2 or more dollars), considered this a supporting action to undertake in the long-term, as an additional incentive mechanism after other actions to provide alternative transportation options and encourage compact development.
7. References:

Draft

TLU Action 2.A.6 – Apply a Surcharge to High-Carbon Fuels

Summary

Apply a higher fuel tax to motor vehicle fuels that have a high carbon intensity⁸ to make these fuels more costly to use, thus providing an incentive for development and use of advanced technologies and lower carbon fuels.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Increasing the tax on high-carbon-intensity fuels to make them more expensive relative to lower-carbon fuels can create demand for, and thus supply of, cleaner fuels.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment* (*e.g., legislation, executive order*): legislation required
 - b. *Resources Required*: funds for consultant to research carbon intensity of various fuels and state staff time to set tax levels.
 - c. *Barriers to Address* (*especially for medium to low feasibility actions*): lack of low carbon fuel options for the transportation sector, lack of sufficient life-cycle data on many fuels to accurately determine carbon intensity
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: all fuel providers and users
 - b. *Parties Paying for Implementation*: all fuel providers and users
 - c. *Parties Benefiting from Implementation*: general public with reduced air pollution and GHG emissions
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*:
 - b. *Proposed*: TLU Action 1.A.3 – Adopt California Low Emission Vehicle (CALEV) Standards
TLU Action 1.C.2 – Promote Advanced Technology Vehicles and Supporting Infrastructure
GLU Action 4.1 – Revise State Vehicle Procurement Policy
6. Timeframe for Implementation: After 2015 or beyond. Alternative low carbon fuels must be available before a carbon surcharge is implemented.
7. Anticipated Timeframe of Outcome: 2025

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.
2. Economic:
 - a. Costs:
 - i. Implementation Cost: Low (to be subject of study)
 - ii. Timing:
 - iii. Impacts:

⁸ Carbon intensity is defined as the relative amount of carbon emitted per unit of energy or fuel consumed.

b. Savings:

- i. Potential Economic Benefit: Supporting mechanism; not individually quantified.
- ii. Timing:
- iii. Impacts:

3. Other Benefits/Impacts:

- a. *Environmental*: As many alternative fuels also lower emissions of ozone pre-cursors and particulate emissions this action would reduce harm to vegetation from ozone, and reducing regional haze issues. This would also lead indirect effects on the fish and wildlife and the ecosystems upon which they depend. If, the surcharge revenues were used to support expansion of public transit, then VMT and associated GHGs emissions could decrease and these benefits could be increased.
- b. *Health*: The human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: These additional revenues also could help support public transit, thereby providing greater transportation choice and helping to meet the needs of the growing elderly population and individuals who cannot afford a personal vehicle. There are added advantages through reduced dependence on foreign oil as well as regional economic development from new local fuels industry. However, by increasing the cost of gasoline, this measure may – depending on the size of the gas-tax increase – adversely affect individuals who cannot, or choose not to, use public transportation, or who otherwise cannot reduce their VMT.
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: The available vehicle technology (e.g., batteries, fuel cells) are still developing, but the demand for LCFs that could be created through “disincentives” such as the added surcharge, could help to drive technological development by providing a guaranteed market. This surcharge could also drive development of advanced biofuels, which currently exist, but are not yet being produced on a commercial scale.
- b. *Economic*: This measure will have economic impacts on individual consumers of gasoline, though those impacts may be reduced for many as a result of behavior modification/reduced VMT. This measure will create economic opportunities for the State by generating additional, much-needed revenues to expand transit opportunities within New Hampshire and to other states.
- c. *Statutory/Regulatory*: Adding another fee will involve political challenges, and will require legislation to implement. Given level of support for climate change actions now this seems more likely to occur.
- d. *Social*: There would be social resistance to adding another “tax” but broad and increasing public support for addressing climate change and use of the revenues to expand transportation options could drive acceptance.

5. Other Factors of Note:

6. Level of Group Interest: Low. The working group recognized the need for substantial additional research on this action and considered this a supporting action to undertake in the long-term, as an additional incentive mechanism once other actions to encourage compact development were in place (*i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO₂ reductions from the transportation and land use sector*)

7. References:

TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking

Summary

Establish an initiative to reduce the availability of free and inexpensive parking. This action would create a disincentive for travel by single-occupancy vehicles and provide an incentive for greater use of public transportation to access services by making parking less readily available and/or more expensive. The result would be fewer vehicle miles traveled and more efficient location choices that facilitate access to activities and services with reduced need for individual vehicles and parking.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): With technical assistance from state government and regional planning agencies, municipalities would study and implement appropriate options for reducing the availability of free and inexpensive parking. The following are among the options to be considered:
 - Reduce parking requirements in zoning for new development under local planning board review.
 - Implement state or local level legislation requiring that all parking spaces be metered.
 - Impose an annual impact fee on businesses and institutions per parking space as an incentive to charge for and reduce parking.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Local policy and/or regulatory/zoning changes, could require legislation or redirection of existing resources to fund technical assistance to implement
 - b. *Resources Required*: Funding for technical assistance to municipalities
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Challenging to implement; there would be considerable social resistance
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Municipalities, with assistance from regional planning commissions.
 - b. *Parties Paying for Implementation*: Car owners.
 - c. *Parties Benefiting from Implementation*: Transit providers.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*: None
 - b. *Proposed*: Other mechanisms that increase the price of additional VMT (greater total increase in cost of driving will produce greater shifts in driving behavior resulting in greater VMT reduction):
 - TLU Action 2.A.2 – Implement Congestion Pricing (*cross-referenced as TLU Action 1.D.5*)
 - TLU Action 2.A.3 – Create a VMT-Based Insurance Premium Structure
 - TLU Action 2.A.4 – Implement VMT-Based Registration Fees
 - TLU Action 2.A.5 – Increase the State Gasoline Tax
 - TLU Action 2.A.6 – Apply a Surcharge to High Carbon Fuels
6. Timeframe for Implementation: Implement later once alternative transportation options are in place to further encourage changes in driving behavior.

7. Anticipated Timeframe of Outcome: Would take many years to change parking pricing and/or availability within municipalities and see associated reductions in VMT.

Program Evaluation

1. Estimated CO₂ Emission Reductions: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Immediate / higher upfront
 - iii. Impacts:
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism; not individually quantifiable
 - ii. Timing:
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend. In addition, there would be reduced noise pollution as well. If, however, enhanced revenues were used to support expansion and construction of new roads, these benefits could be lost and VMT and associated GHGs could actually increase.
 - b. *Health*: Reduced Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: By increasing the cost of vehicle use, this measure could adversely affect individuals who cannot, or choose not to, use public transportation, or who otherwise cannot avoid parking.
 - d. *Other*
4. Potential for Implementation (i.e., including challenges, obstacles and opportunities):
 - a. *Technical*: There are significant technical barriers and challenges to implementing this measure.
 - b. *Economic*: This measure will have economic impacts on individual consumers, though those impacts may be reduced for many as a result of behavior modification/reduced VMT.
 - c. *Statutory/Regulatory*:
 - d. *Social*: There would be social resistance as this may be considered a burden in communities without viable transportation ecosystems.
5. Other Factors of Note:
6. Level of Group Interest: Moderate. Although this can be an effective action to motivating changes in driving behavior, because of the difficult nature of implementing this action, the working group considered this a supporting action to undertake in the long-term once alternative transportation options are in place and compact development options are supported (i.e., this supports other actions – enabling additional reductions, but is not considered “essential” to achieve substantial CO₂ reductions from the transportation and land use sector).
7. References:

TLU Action 2.B.1.a – Expand Local/Intra-Regional Transit (Bus) Service

Summary

Expand the service areas of existing local and intra-regional transit (bus) systems and create new systems to: 1) provide service for all communities with 20,000 or more population; 2) provide service connections for all communities having 10,000 or more population *and* a defined, walkable, mixed-use central area (of at least 100 acres); 3) provide connections to smaller satellite communities by extending existing local/intra-regional transit systems serving New Hampshire's largest cities and population centers (Manchester, Nashua, Concord, and Seacoast); and 4) identify and implement additional local transit options over time.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Existing local bus service within New Hampshire has experienced significant growth in ridership over the last 3 to 5 years but does not yet provide service to many larger communities or to multiple towns within various regions. This action would expand the service areas of local transit systems and create new systems to provide service to most communities with 10,000+ population as well as smaller communities in close proximity to New Hampshire's largest population centers. Providing transit service to currently unserved areas and a greater percentage of New Hampshire's residents would reduce single-occupancy vehicle use and vehicle miles traveled (VMT). It is assumed that new bus transit would be introduced at a minimum level of service (e.g., 4 roundtrips per day) and supported by the necessary marketing/promotion. The level of service would be increased over time along with implementation of complementary policies to increase ridership.
2. Implementation Plan (*i.e., how to implement the specific policy or program*)
 - a. *Method of Establishment (e.g., legislation, executive order)*: Metropolitan Planning Organizations (MPOs) (or Regional Planning Commissions (RPCs) in areas without an MPO), in coordination with funding and technical guidance from NHDOT, work with local transit providers, regional/local transportation councils, and municipalities to establish and/or expand service. Legislative action is likely required to provide for increased funding and technical assistance (particularly to establish new service in more rural areas).
 - b. *Resources Required*
 - MPO (or RPC) and NHDOT staff time (will require additional staff time to establish service – coordinate with local municipalities, prepare necessary studies to design service, establish new local/regional nonprofit organizations to manage systems)
 - Funding (local/state match \$) for studies required to establish service and receive Federal funding.
 - Capital investment in infrastructure (e.g., buses, bus stop facilities (bench, shelters))
 - Operating subsidy and marketing
 - Some portion of the funding could be Federal, although local/state match is required. Local match could be generated from a local vehicle registration fee (e.g., \$5 per vehicle for 11-town Greater Derry Greater Salem region would generate approximately \$700,000 per year (Salem-Derry 2003)) or other options discussed under Action 2.B.2.c.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Requires significant public investment and potential operating subsidy in the near term.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: MPOs/RPCs and NHDOT, local transit providers, regional/local transportation councils, municipalities.

- b. *Parties Paying for Implementation:* A variety of funding options and combinations are currently used to support local transit systems, including local governments, passengers using service, matched Federal funding, and local business sponsorship. A significant expansion of service in multiple areas across the state will likely require additional support (financial and technical) from state government.
- c. *Parties Benefiting from Implementation:*
 - NH population as a whole benefits from reduced vehicle travel and air pollution
 - NH population benefits from improved access to bus service for local travel (potential individual cost savings for such travel) and improved connections to rail and inter-city bus options for longer-distance travel
 - NH “transit needy” residents are better served (including disabled and economically disadvantaged populations) and transportation cost for social service organizations could be reduced.
 - NH employers would have improved access to labor (particularly in high housing cost areas)

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. *Existing:*

New Hampshire currently has 11 local/intra-regional transit service providers serving Hanover (and surrounding area), Manchester, Nashua, Concord, Coastal New Hampshire (several routes), UNH and surrounding communities, Laconia, North Country (service in Berlin-Gorham and Littleton-Lancaster), Keene, Derry-Salem, and Claremont. These services served almost 3 million passengers in 2006 (including parking lot shuttles at UNH and in Hanover – almost 2 million passengers on transit alone). Many of these systems are continuing to explore expansion and improvements to their service (much of which is capture within this action).

The Greater Derry Greater Salem Regional Transportation Council (RTC) was formed in 1998 to study and implement transit within an 11 town region (Chester, Derry, Londonderry, Sandown, Danville, Hampstead, Atkinson, Plaistow, Salem, Windham, and Pelham). Salem-Derry service is now operating as a demand-response system, with a fixed-route planned to begin in 2008-2009.

b. *Proposed:*

- Complementary policies that facilitate people making use of local bus service (such as easy connections to inter-city travel options, high-quality and frequency of service, improved walkability around transit access points to allow them to easily reach their final destination) could result in substantially higher levels of ridership over the long-term. Local/intra-regional bus service also facilitates increased use of longer-distance, inter-city transit/bus by ensuring that passengers can easily access the surrounding area upon arriving at the terminating point of the intercity bus trip.
- Policies that provide funding to support bus, rail, and bike/pedestrian transportation improvements (see Action 2.C.2.c discussion on options for dedicated funding for public transit).
- Expansion and enhancement of inter-city bus and rail services (e.g., increased service, upgraded terminals, improved marketing/informational resources), when connected to local transit systems.
- Enhancement of existing local transit services (increased service, improved amenities, increased marketing), particularly valuable for components of this action involving extensions of existing services.

- Compact, mixed-use, walkable development (including affordable housing) in the vicinity of transit access points can facilitate further reductions in VMT (eliminating additional travel by having access to other needs near transit access) and increase access of residents to local transit service.
 - Policies that increase the cost of using a vehicle for travel (e.g., increased gas prices, higher parking charges, VMT-based insurance and/or registration).
6. **Timeframe for Implementation:** New services could be phased in over time beginning in 2010-2012 as state/local funding becomes available (could be matched to federal funding) with an initial focus on providing service for higher-population areas currently lacking fixed-route service (i.e., Salem-Derry area, Manchester surrounding region, Nashua surrounding region). New services could continue to be added for areas with adequate population and compact development to facilitate effective transit service.
7. **Anticipated Timeframe of Outcome:** Reductions in VMT would begin to be realized as soon as new service is implemented, and would be expected to increase over time as service is improved and marketed and complementary policies are put in place to increase ridership.

Program Evaluation

1. **Estimated CO₂ Emission Reduction:** Quantified together with TLU Action 2.B.1.b
2. **Economic Effects:**
 - a. **Costs:**
 - i. **Implementation Cost:** Moderately low
 - ii. **Timing:** Constant / even
 - iii. **Impacts:** Consumer – evenly distributed
 - b. **Savings:**
 - i. **Potential Economic Benefit:** Moderate
 - ii. **Timing:** Constant / even
 - iii. **Impacts:** Consumer – evenly distributed
3. **Other Benefits/Impacts:**
 - a. ***Environmental:*** This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. ***Health:*** Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. May also increase the use of more active travel modes (walk/bike) for part of trip, improving health of individuals.
 - c. ***Social:*** Improved mobility for “transit needy” populations. Important component of balanced, multi-modal transportation system.
4. **Potential for Implementation (i.e., including challenges, obstacles and opportunities):**
 - a. ***Technical:*** Moderate / low. Requires significant coordination of multiple entities to establish new local transit service. Expansion of the service area of existing entities to provide service to additional areas is

likely easier to implement. State-level coordination/oversight would be useful in creating a coordinated network throughout NH.

- b. *Economic*: Low. Funding constraints are significant – will require identification and implementation of new funding mechanisms for capital and operating expenses. Local municipalities are authorized (HB 648, 1998 – get RSA citation) to collect an additional motor vehicle registration fee of up to \$5.00 for the purposes of supporting a municipal transportation improvement fund to support a wide-variety of transportation system improvements, including public transportation (few communities currently are taking advantage of this authority – check!). Implementation would be particularly difficult if dependent solely on municipal funding (or dependent on local authorization – e.g., town vote).
 - c. *Statutory/Regulatory*: Low. Difficult to establish new funding mechanism, likely will require legislative support (at state level) and local community support (e.g., town meeting vote) to secure required funding.
 - d. *Social*: Moderate. There is growing support for providing a balanced, multi-modal transportation system, but support for local funding would likely be difficult to obtain. Recent increases in ridership of existing local transit systems indicate positive demand for this service. Marketing is required to generate ridership (e.g., educate public on availability, convenience, access to system, benefits) and reduce view of bus travel as inferior to SOV travel.
5. Other Factors of Note: There are several recent studies within NH exploring options for establishing new local and/or inter-city bus services (e.g., Carroll County 2007, Salem-Derry 2003, Meredith 2004, Nashua 2003). These studies – together with information available on the cost and performance of current systems – provide the basis for estimating the cost and ridership (and resulting reduction in VMT) associated with this action.

If portions of NH are included as part of the Boston Urbanized Area after the next Census (2010), those areas will no longer be eligible for federal financial support for operating expenses for transit and additional local/state funding sources will be required.

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

- NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008.
- Community Transportation Association of America, *Carroll County, NH Transit Operations Expansion*, Final Report, November 1, 2007.
- Lakes Region Planning Commission, *Study of Expanded Transit Service in Meredith, NH*, Final Report, November 2004.
- Greater Derry Greater Salem Regional Transportation Council, Rockingham Planning Commission, Southern NH Planning Commission, and Nashua Regional Planning Commission, *Greater Derry Greater Salem Regional Transit Plan*, 2003.
- Nashua Regional Planning Commission, *Transit Plan for the Nashua Region*, December 2003.
- Cooperative Alliance for Seacoast Transportation, website for bus service to several routes throughout the coastal region of New Hampshire, www.COASTbus.org.

TLU Action 2.B.1.b – Improve Existing Local/Intra-Regional Transit (Bus) Service

Summary

Improve local bus service within New Hampshire on *existing* routes by providing more frequent service, better passenger amenities and facilities, and increased marketing to expand ridership.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): New Hampshire's existing 11 local bus systems have experienced significant growth in ridership over the last 3 to 5 years. Increases in the price of fuel and individual vehicle operation, together with strategic improvements in existing service, have contributed to the rise in ridership. This action would 1) increase the frequency of service on *existing routes* to reduce wait times and provide greater flexibility for passenger travel, 2) provide additional passenger amenities, and 3) expand marketing and provide easier access to schedules and service information to attract additional ridership. (*Note: Adding new routes to expand the area served by local transit is covered separately under Action 2.B.1.a.*) Expanded availability and use of local transit is essential to reducing total vehicle miles traveled and reliance on single-occupancy vehicles.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):

a. *Method of Establishment (e.g., legislation, executive order)*:

Local transit providers would assume the lead on identifying and implementing service improvements likely to increase ridership most significantly. Assistance and grant funding could be coordinated by the Metropolitan Planning Organizations (MPOs) or Regional Planning Commissions (RPCs), together with NHDOT. Legislative action is likely required to provide for increased funding and technical assistance to identify and implement appropriate actions.

b. *Resources Required*:

- MPO (or RPC) and NHDOT staff time (will require additional staff to coordinate assistance program).
- Funding (local/state match for Federal \$) for studies required to identify appropriate improvements.
- Initial and on-going capital investment for additional buses to expand services and bus stop amenities (e.g., benches, shelters, signage).
- Operating subsidy and marketing expenses
- Some portion of the funding could be Federal, although local/state match is required. Local match could be generated from a local vehicle registration fee (e.g., \$5 per vehicle for 11-town Greater Derry Greater Salem region would generate approximately \$700,000 per year (Salem-Derry 2003)).

c. *Barriers to Address (especially for medium to low feasibility actions)*: Requires significant public investment and potential operating subsidy in the near term.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

a. *Parties Responsible for Implementation*: Local transit providers, with coordination by MPOs/RPCs and/or NHDOT.

b. *Parties Paying for Implementation*

A variety of funding options and combinations are currently used to support local transit systems, including local governments, passengers using service, matched Federal funding, and local business

sponsorship. A significant investment in improving current service in multiple areas across the state will likely require additional support (financial and technical) from state government.

c. *Parties Benefiting from Implementation*

- NH population as a whole benefits from reduced vehicle travel and air pollution
- NH population benefits from improved access to bus service for local travel (potential individual cost savings for such travel) and improved connections to rail and inter-city bus options for longer-distance travel
- NH “transit needy” residents are better served (including disabled and economically disadvantaged populations) and transportation cost for social service organizations could be reduced.
- NH employers would have improved access to labor (particularly in high housing cost areas)

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

- a. *Existing:* New Hampshire currently has 11 local transit service providers serving Hanover (and surrounding area), Manchester, Nashua, Concord, Coastal New Hampshire (several routes), UNH, Laconia, North Country (service in Berlin-Gorham and Littleton-Lancaster), Keene, Derry-Salem, and Claremont. These services served almost 3 million passengers in 2006 (including parking lot shuttles at UNH and in Hanover – almost 2 million passengers on transit alone). Many of these systems are continuing to explore expansion and improvements to their service.
- b. *Proposed:*
 - Policies that provide funding to support bus, rail, and bike/pedestrian transportation improvements (see Action 2.C.2.c discussion on options for dedicated funding for public transit).
 - Expansion and enhancement of inter-city bus and rail services (e.g., higher quality buses, terminals, improved marketing/informational resources), when connected to local transit systems.
 - Compact, mixed-use, walkable development (including affordable housing) in the vicinity of transit access points can facilitate further reductions in VMT (eliminating additional travel by having access to other needs near transit access) and increase access of residents to local transit service.
 - Policies that increase the cost of using a vehicle for travel (e.g., increased gas prices, higher parking charges, VMT-based insurance and/or registration).

6. Timeframe for Implementation: Improved services and amenities could be phased in over time beginning in 2010-2012 as state/local funding becomes available (could possibly be matched to federal funding) with an initial focus on increasing/improving service for higher-population areas (*i.e., Southern New Hampshire: Manchester, Nashua, and Seacoast*).

7. Anticipated Timeframe of Outcome: Reductions in VMT would begin to be realized as soon as services are improved, and would be expected to increase over time as service is further improved and marketed and complementary policies are put in place to increase ridership.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- | | |
|------------------------|--------------------------------|
| a. Short-term (2012): | 0.01 MMTCO ₂ e/year |
| b. Medium-term (2025): | 0.11 MMTCO ₂ e/year |
| c. Long-term (2050): | 0.29 MMTCO ₂ e/year |

2. Economic:

a. Costs:

- i. Implementation Cost: Moderately low
- ii. Timing: Constant / even
- iii. Impacts: Consumer – evenly distributed

b. Savings:

- i. Potential Economic Benefit: Moderate
- ii. Timing: Constant / even
- iii. Impacts:

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. May also increase the use of more active travel modes (walk/bike) for part of trip, improving health of individuals.
- c. *Social*: Improved mobility for “transit needy” populations. Important component of balanced, multi-modal transportation system.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Moderate / high. Most local transit providers are well-aware of the type of service improvements and amenities required to attract additional riders, making it relatively easy to implement improvements if sufficient funding is provided. State- or regional-level coordination/oversight would be necessary to distribute funds and share information regarding the most effective strategies. A consistent level and quality of service provided by all systems across NH will provide greater certainty for passengers (reducing uncertainty and facilitating the use of transit when traveling to new areas).
- b. *Economic*: Low. Funding constraints are significant – will require identification and implementation of new funding mechanisms for capital and operating expenses. Local municipalities are authorized (HB 648, 1998 – get RSA citation) to collect an additional motor vehicle registration fee of up to \$5.00 for the purposes of supporting a municipal transportation improvement fund to support a wide-variety of transportation system improvements, including public transportation (few communities currently are taking advantage of this authority – check!). Implementation would be particularly difficult if dependent solely on municipal funding (or dependent on local authorization – e.g., town vote).
- c. *Statutory/Regulatory*: Low. Difficult to establish new funding mechanism, likely will require legislative support (at state level) and local community support (e.g., town meeting vote) to secure required funding.
- d. *Social*: Moderate. There is growing support for providing a balanced, multi-modal transportation system, but support for local funding would likely be difficult to obtain. Recent increases in ridership of existing local transit systems indicate positive demand for this service, however, there are significant social barriers to increasing ridership. Marketing is required to generate ridership (e.g., educate public on availability, convenience, access to system, benefits) and reduce view of bus travel as inferior to SOV travel.

5. Other Factors of Note: Although this action by itself is estimated to result in relatively small reductions in VMT, there are substantially greater reductions available in expanding local bus service as part of a comprehensive multi-modal transportation investment program – particularly for NH’s more populated regions. Complementary policies that facilitate people making use of local bus service (such as easy connections to inter-city travel options, high-quality and frequency of service, improved walkability around transit access points to allow them to easily reach their final destination) could result in substantially higher levels of ridership.

If portions of NH are included as part of the Boston Urbanized Area after the next Census (2010), those areas will no longer be eligible for federal financial support for operating expenses for transit and additional local/state funding sources will be required.

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

- NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008.
- Nashua Regional Planning Commission, *Transit Plan for the Nashua Region.*, December 2003.
- Cooperative Alliance for Seacoast Transportation, website for bus service to several routes throughout the coastal region of New Hampshire, www.COASTbus.org.

TLU Action 2.B.1.c – Expand and Improve Bicycle and Pedestrian Infrastructure

Summary

Improve and expand bicycle and pedestrian infrastructure to increase the viability of these travel modes as options for shorter-distance local trips, particularly within existing community centers, around transit-access points, and in other areas of higher-density, compact, mixed-use development.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Example policy actions to implement/continue:
 - Expand existing bicycle routes program with NHDOT with an emphasis on local and intra-regional networks.
 - Implement “complete streets” roadway improvement standards (at local and state levels).
 - Continue implementation of the Context Sensitive Solutions (CSS) project development approach by NHDOT.
 - Encourage adoption of higher-density, mixed-use zoning in pedestrian-oriented areas and apply pedestrian-oriented design standards for new residential and commercial development (see actions under TLU Goal 2.C).
 - Continue/expand “Safe Routes to School” program by NHDOT.

Improving the availability of biking and walking as a viable travel option would help reduce single-occupancy vehicle use and total vehicle miles traveled, particularly for short-distance, local trips within compact areas and around transit-access points.

2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: NHDOT could expand its existing bike-ped program, along with implementing “complete streets” approaches that ensure that all modes of travel are accommodated and supported. Assistance and grant funding could be coordinated by the Metropolitan Planning Organizations (MPOs) or Regional Planning Commissions (RPCs), together with NHDOT. Legislative action is likely required to provide for increased funding and technical assistance to identify and implement appropriate actions.
 - b. *Resources Required*
 - MPO (or RPC) and NHDOT staff time (will require additional staff to coordinate assistance program).
 - Funding (local/state match for Federal \$) for studies required to identify appropriate improvements.
 - Initial and on-going capital improvements.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Acceptance of bicycle and pedestrian facilities (in some places). Could involve increased costs for projects.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Local municipalities, with coordination by MPOs/RPCs and/or NHDOT.
 - b. *Parties Paying for Implementation*: Local municipalities. Significant investments in multiple areas across the state will likely require additional support (financial and technical) from state government.

- c. *Parties Benefiting from Implementation:* NH population as a whole benefits from reduced vehicle travel and air pollution. Can help strengthen communities – increasing economic activity and community vitality.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:* NHDOT planning/project emphasis on Context Sensitive Solutions, *complete streets*, and existing bicycle/pedestrian program, NHDOT funding programs (e.g., TE, CMAQ).
 - b. *Proposed*
 - Policies that provide funding to support bus, rail, and bike/pedestrian transportation improvements (see Action 2.C.2.c discussion on options for dedicated funding for public transit).
 - Expansion and enhancement of local bus services.
 - Zoning to provide compact, mixed-use, walkable development (including affordable housing) (see 2.C. Actions)
 - Policies that increase the cost of using a vehicle for travel:
 - TLU Action 2.A.2 – Implement Congestion Pricing (*cross-referenced as TLU Action 1.D.5*)
 - TLU Action 2.A.3 – Create a VMT-Based Insurance Premium Structure
 - TLU Action 2.A.4 – Implement VMT-Based Registration Fees
 - TLU Action 2.A.5 – Increase the State Gasoline Tax
 - TLU Action 2.A.6 – Apply a Surcharge to High Carbon Fuels
 - TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking
6. Timeframe for Implementation: On-going beginning in 2010-2012 as state/local funding becomes available (could possibly be matched to federal funding) with an initial focus on increasing facilities in higher-population areas (*i.e., community centers within southern NH*) and where roadway/streetscape improvements are planned.
7. Anticipated Timeframe of Outcome: Reductions in VMT would begin to be realized as soon as bike/ped facilities are improved.

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.02 MMTCO₂e/year
 - b. Medium-term (2025): 0.08 MMTCO₂e/year
 - c. Long-term (2050): 0.11 MMTCO₂e/year
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Moderately low
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer – evenly distributed
 - b. Savings:
 - i. Potential Economic Benefit: Supporting Mechanism
 - ii. Timing:
 - iii. Impacts:

3. Other Benefits/Impacts:

- a. *Environmental*: Reduced air emissions from SOV travel and congestion. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. May also increase the use of more active travel modes (walk/bike) for part of trip, improving health of individuals.
- c. *Social*: Improved communities – increased economic activity and community vitality

4. Potential for Implementation (i.e., including challenges, obstacles and opportunities):

- a. *Technical*: High / Moderate.
- b. *Economic*: Moderate. Funding constraints are significant – likely will require identification and implementation of new funding mechanisms. Local municipalities are authorized (HB 648, 1998 – get RSA citation) to collect an additional motor vehicle registration fee of up to \$5.00 for the purposes of supporting a municipal transportation improvement fund to support a wide-variety of transportation system improvements, including bike/ped improvements (few communities currently are taking advantage of this authority).
- c. *Statutory/Regulatory*: High / Moderate. Policy already has moved this direction. However, could be difficult to obtain funding. Could require legislative support (at state level) and local community support (e.g., town meeting vote) to secure required funding.
- d. *Social*: High / Moderate. There is growing support for providing a balanced, multi-modal transportation system, but support for local funding could be difficult to obtain.

5. Other Factors of Note: N/A

6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the near-term (i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector)

7. References:

- NHDOT. *NH Long Range Transportation Plan: A Framework for Transforming Transportation in New Hampshire*, Public Draft. May 1, 2008.
- Federal Highway Administration. *Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program, SAFETEA-LU Section 1807*, <http://www.fhwa.dot.gov/environment/bikeped/ntpp/index.htm>.

TLU Actions 2.B.2.a – Maintain and Expand Passenger Rail Service

Summary

Maintain and expand passenger rail service within New Hampshire as part of a balanced, state-wide, multi-modal transportation system that keeps the state competitive with and accessible to the region. Initial actions would focus on sustaining and improving existing passenger rail service. Near- to mid-term actions would focus on improving and expanding New Hampshire's primary travel corridors (I-93 from Salem through Manchester to Concord, and the full traverse of I-95 on the Seacoast). Long-term actions would address the goal of expanding passenger rail service throughout New Hampshire.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): New Hampshire would undertake measures to support and extend passenger rail service within the state as part of a balanced, multi-modal transportation system. The following timeline and actions are proposed:
 - a. Immediate initiatives: Sustain and improve existing passenger rail service and plan for future service, as follows:
 - Provide dedicated, long-term financial support;
 - Make strategic improvements to service, e.g., improve intermodal facilities and make track upgrades to support higher speeds;
 - Protect active/inactive rail corridors; and
 - Expand rail service planning (consider a 10-year rail investment plan).
 - b. Near-term actions:
 - Implement new services now under study, e.g., extensions from Massachusetts to Nashua and Manchester, and from Newburyport to Kittery; and
 - Because Canada is New Hampshire's major trading partner, improve/restore lost rail connections to support both freight and passenger service to Canada.
 - c. Future actions:
 - Review the historic rail system for possible applicability to future rail service, and
 - Study and implement additional extensions and restorations of service with the goal of establishing a state-wide passenger rail system.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Continue and extend role of NHDOT and newly-formed NH Rail Authority. Involve other interested parties such as state agencies, business development and social service organizations. A fully developed multi-modal system would require legislation, the revision of zoning ordinances, education and changes in spending and policy at federal, state and local levels.
 - b. *Resources Required*: Substantial funding required for studies, capital improvements, land acquisition, and operating expenses.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*:
 - Requires significant (and continued) public expenditure
 - Need for improved understanding regarding how individual modes interact and extent of benefits available from a complete multi-modal system.

- Restoration of the connectivity that existed in the historic rail system, which once had 24 points of rail access to neighboring states and Canada. In the Southern tier only the Downeaster corridor exists. (For instance there is not a direct rail connection with Canada our major trading partner.) All others have been temporarily lost but could in certain cases be restored by using those abandoned corridors preserved in the NH DOT railbanking program.
 - Local zoning typically does not envision the restoration of a rail transportation system and does not allow for transit-oriented development.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* The parties involved include a collaboration of planning agencies, federal, state and local government, the business community, media organizations and advocacy organizations and the general public
 - b. *Parties Paying for Implementation:* Various government entities, the general public and the business community.
 - c. *Parties Benefiting from Implementation:* The general public, the business community (particularly those that can redirect long-distance shipping from truck to rail), economic development entities, social service agencies, the tourism industry, as well as municipalities.
 4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
 5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:*
 - NH has railbanked many miles of old rail corridors that parallel all of our main highways.
 - Downeaster service through NH – needs to be sustained.
 - Increased Federal funding for rail system improvements
 - b. *Proposed.*
 - Expansion and improvement of other modes of public transportation (*i.e., bus service*) as well as complementary facilities (*e.g., intermodal facilities*) – see actions under category 2B.
 - Complementary land uses emphasizing higher-density, mixed-use, walkable development (including affordable housing) in the vicinity of rail stations (see actions under category 2C, particularly 2.C.2).
 6. Timeframe for Implementation: Immediate actions can be taken to sustain and improve existing service. Service extensions now under study can/should be implemented within 10-20 years. State-wide passenger service will take 20-30 years to restore.
 7. Anticipated Timeframe of Outcome: The benefits of a transportation system with passenger rail would occur in anticipation of the first train (as land development is influenced). Benefits would increase over time as travel behavior and land use adjust.

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.00 MMTCO₂e/year
 - b. Medium-term (2025): 0.05 MMTCO₂e/year
 - c. Long-term (2050): 0.15 MMTCO₂e/year

2. Economic Effects:

a. Costs:

- i. Implementation Cost: Moderate
- ii. Timing: Constant / even
- iii. Impacts: Evenly distributed

b. Savings:

- i. Potential Economic Benefit: Very high
- ii. Timing: Constant / even
- iii. Impacts: Evenly distributed

3. Other Benefits/Impacts:

- a. *Environmental*: Better use of land if encourage compact, transit-oriented development near stations, as well as enhanced air quality due to reduced emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. Also, avoids tension from driving and encourages walking through transit-oriented development around rail stations.
- c. *Social*: Public transportation options can provide additional travel opportunities for citizens and increase community vitality by increasing opportunities for human interaction on a daily basis. Provide transportation options for the elderly and handicapped.

See Litman, Todd. *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*. January 2008. Victoria Transport Policy Institute. Table 3.1 provides a listing of potential social costs and benefits associated with transit investments, including (among others) mobility and travel efficiency improvements, health benefits, and economic development gains. This report also has a good discussion comparing the benefits of bus and rail service.

- d. *Other*: Improves the marketability of property near rail stations and corridors. Freight rail allows for choice in the shipment of goods thus allowing for more opportunity to obtain competitive prices for shipping materials. Provides a choice in transportation modes between car, bus and rail.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*): With the establishment of the transit authority and the passage of a rail liability bill, passenger rail is finally being acknowledged as an alternative mode of transportation. However, in addition to the issue of funding there is the challenge of the reduced size of the rail infrastructure.

- a. *Technical*: An evaluation is being conducted to extend rail service beyond Lowell to Nashua and Manchester. The Rt. 93 transit study is expected to recommend rail as a transit enhancement. The Rockingham Planning Commission has evaluated an extension of rail service beyond Newburyport to Kittery. Phase one of a study to evaluate Boston-Montreal high speed rail service.
- b. *Economic*: Two reports commissioned by the city of Manchester confirm that transit would be a key to it economic well being. The Northern New England Passenger Rail Authority (NNEPRA) operators of the Downeaster, have released a study that confirms the positive effect of rail on economic development (4). Nashua Regional Planning Commission has commissioned a similar study with the same results.(1)
- c. *Statutory/Regulatory*: Excellent as NH has created a transit authority to develop and operate rail. Governor Lynch ha signed into law a passenger rail liability cap bill. Limited funding for public transportation is still a significant barrier that needs to be addressed.

- d. *Social*: There is growing public support for the restoration of rail service in New Hampshire, although this can be tempered by concerns regarding specific alignments. Rail as exemplified by the Downeaster has served to recondition the public perception on rail from a vestige of nostalgia to one that is part of the fabric of daily life.
5. Other Factors of Note: The renewed interest in rail is relatively recent in NH but not to the region or the country where billions are being invested in the creation and expansion of rail corridors for freight and passenger needs as well as the reintroduction of ferry service.
6. Level of Group Interest: High. The working group considered this an essential action that required initial action in the near-term and continuing effort over the mid- and long-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
- Nashua Regional Planning Commission, www.nashuarpc.org.
 - New Hampshire DOT I93 investment study, <http://www.i93transit.org>.
 - Commuter Rail service to Coastal NH, A feasibility study for the Hampton Branch, email @rpc-nh.org.
 - Manchester Reports available through the City of Manchester Planning Department, Downeaster study available through Northern New England Rail Passenger Authority (NNEPRA)
 - <http://www.transport2000.ca/atlantic/railvsroad.html>.
 - NHDOT, NH Long Range Transportation Plan: A Framework for Transforming Transportation in New Hampshire, Public Draft, May 1, 2008.
 - NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008

TLU Action 2.B.2.b – Maintain and Expand Freight Rail Service

Summary

Maintain and expand freight rail service within the New Hampshire as part of a balanced, state-wide, multi-modal transportation system that keeps the state competitive with and accessible to the region. Initial actions would focus on sustaining and improving existing freight rail service. Near- to mid-term actions would include strategic improvements and expansions to increase freight rail usage. Long-term actions would address the goal of expanding freight rail service throughout New Hampshire.

Program Description

1. Mechanism (i.e., how the policy or program achieves the desired result): New Hampshire would undertake measures to support and extend freight rail service within the state as part of a balanced, multi-modal transportation system. The following timeline and actions are proposed:
 - a. Immediate initiatives: Sustain and improve existing freight rail service and plan for future service, as follows:
 - Provide dedicated, long-term financial support;
 - Make strategic improvements to service, e.g., increase tunnel clearance for freight passage, improve intermodal facilities, and make track upgrades to support higher speeds;
 - Protect active/inactive rail corridors; and
 - Plan for expanded rail service (consider a 10-year rail investment plan; conduct a survey similar to what Massachusetts has recently announced to evaluate current freight service and the potential for future freight business).
 - b. Near-term actions: Because Canada is New Hampshire's major trading partner, improve/restore lost rail connections to support both freight and passenger service to Canada.
 - c. Future actions:
 - Review the historic rail system for possible applicability to future rail service, and
 - Study and implement additional extensions and restorations of service with the goal of establishing a state-wide freight rail system.
2. Implementation Plan (i.e., how to implement the specific policy or program):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Continued and extended role of NHDOT and newly-formed NH Rail Authority. Involve other interested parties such as state agencies, business development and social service organizations. A fully developed multi-modal system would require legislation, the revision of zoning ordinances, education and changes in spending and policy at federal, state and local levels.
 - b. *Resources*: Substantial funding required for studies, capital improvements, land acquisition, and operating expenses.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*:
 - Requires significant (and continued) public expenditure
 - Need for improved understanding regarding how individual modes interact and extent of benefits available from a complete multi-modal system.
 - Interacting with existing freight carriers – understanding benefits of multi-modal system (versus perception as competition for business)

- Acceptance of the concept that there is the opportunity for greater freight rail business. Nationally, freight rail capacity cannot keep up with business demands.
 - Restoration of the connectivity that existed in the historic rail system, which once had 24 points of rail access to neighboring states and Canada. In the Southern tier only the Downeaster corridor exists. (For instance there is not a direct rail connection with Canada our major trading partner.) All others have been temporarily lost but could in certain cases be restored by using those abandoned corridors preserved in the NH DOT railbanking program.
 - Local zoning typically does not envision the restoration of a rail transportation system.
 - Public resistance to restored/increased use of rail for freight (e.g., noise and safety concerns)
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* The parties involved include a collaboration of planning agencies, federal, state and local government, the business community, media organizations and advocacy organizations and the general public.
 - b. *Parties Paying for Implementation:* Various government entities, the general public and the business community.
 - c. *Parties Benefiting from Implementation:* The general public, the business community (particularly those that can redirect long-distance shipping from truck to rail), economic development entities, social service agencies, the tourism industry, as well as municipalities.
 4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): In
 5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:*
 - EPA SmartWay Program, which works with businesses to explore potential benefits of rail freight options.
 - NH has railbanked many miles of old rail corridors that parallel all of our main highways.
 - Increased Federal funding for rail system improvements
 - b. *Proposed:* Expansion and improvement of complementary facilities (e.g., intermodal facilities). See actions under TLU Goal 2.B.
 6. Timeframe for Implementation: Improvements to enhance freight service could occur over time, beginning with improvements in areas of existing service.
 7. Anticipated Timeframe of Outcome: Immediate benefits of enhanced freight service through reduced truck travel and emissions.

Program Evaluation

1. Estimated CO₂ Emission Reductions: ANALYSIS UNDERWAY
 - a. Short-term (2012):
 - b. Medium-term (2025):
 - c. Long-term (2050):
2. Economic:
 - a. Costs:
 - i. Implementation Cost: Moderate
 - ii. Timing: Constant / even
 - iii. Impacts: Evenly distributed

b. Savings:

- | | |
|--------------------------------|--------------------|
| i. Potential Economic Benefit: | Very high |
| ii. Timing: | Constant / even |
| iii. Impacts: | Evenly distributed |

3. Other Benefits/Impacts:

- a. *Environmental*: Greatly reduced air pollution per ton of freight transported. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*:
 - d. *Other*: Improves the marketability of property near rail stations and corridors. Freight rail allows for choice in the shipment of goods thus allowing for more opportunity to obtain competitive prices for shipping materials. Provides a choice in transportation modes between car, bus and rail.
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*): With the establishment of the transit authority and the passage of a rail liability bill, passenger rail is receiving greater emphasis. However, in addition to the issue of funding, there is the challenge of the reduced size of the rail infrastructure and the lack of focused development effort for freight rail.
- a. *Technical*: Technical issues would need to be studied.
 - b. *Economic*:
 - c. *Statutory/Regulatory*: Excellent as NH has created a transit authority to develop and operate rail. Limited funding for public transportation is still a significant barrier that needs to be addressed.
 - d. *Social*: There is growing public support for the restoration of rail service in New Hampshire, although this can be tempered by concerns regarding specific alignments.
5. Other Factors of Note: The renewed interest in rail is relatively recent in NH but not to the region or the country where billions are being invested in the creation and expansion of rail corridors for freight and passenger needs as well as the reintroduction of ferry service.
6. Level of Group Interest: High. The working group considered this an essential action that required initial action in the near-term and continuing effort over the mid- and long-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
- Nashua Regional Planning Commission, www.nashuarpc.org.
 - New Hampshire DOT I93 investment study, <http://www.i93transit.org>.
 - Commuter Rail service to Costal NH, A feasibility study for the Hampton Branch, email @rpc-nh.org.
 - Manchester reports available through the City of Manchester Planning Department.
 - Downeaster study available through Northern New England Rail Passenger Authority (NNEPRA).
 - <http://www.transport2000.ca/atlantic/railvsroad.html>.

- NHDOT, NH Long Range Transportation Plan: A Framework for Transforming Transportation in New Hampshire, Public Draft, May 1, 2008.
- NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008.

Draft

TLU Action 2.B.2.c – Implement a Stable Funding Stream to Support Public Transportation

Summary

Identify and implement a dedicated funding stream to support significant expansion of public transportation in New Hampshire. Public transportation is essential to establishing a balanced, less carbon-intensive transportation system within the state. Public transportation also complements, promotes, and supports low-GHG impact development. However, the current lack of adequate funding is a major impediment to the expansion and operation of public transportation.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): A dedicated funding stream to support public transportation could be established by implementing or enabling one or more of the following actions:
 - Increasing the gas tax and amending Article 6-a of the New Hampshire Constitution to remove current restrictions on the use of gas tax revenues for public transportation;
 - Enabling municipalities to adopt a gasoline tax dedicated to public transportation and transit-oriented development;
 - Increasing the amount of the local vehicle registration fee that municipalities can impose to raise funds for transportation projects (currently set at \$5 per vehicle);
 - Adopting and dedicating some or all revenues from a feebate program; and/or
 - Adopting and dedicating some or all revenues from a carbon surcharge.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Removing restrictions on the use of gas-tax revenues would require legislative and other processes needed to amend the constitution. All other mechanisms would require legislation.
 - b. *Resources Required*: Analysis to determine best and most viable sources/options for generating dedicated funds.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Political
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: For amendment of Article 6-a, the Legislature and voting public. For all other measures, the Legislature. Could involve significant state staff and non-governmental staff time to analyze options and support proposed legislation.
 - b. *Parties Paying for Implementation*: Consumers of fuels
 - c. *Parties Benefiting from Implementation*: All of New Hampshire, as a result of reduced GHGs, reduced VMT, greater transportation choice, and economic development opportunities associated with transit-oriented development.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): The state's smart growth policy, RSA Chapter 9-B.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*: This action, by generating funds to support public transportation, will reduce wear & tear on highways, thereby supporting efforts to maintain existing roads and bridges.

- b. *Proposed:* Actions that add or increase fees or other charges, such as Feebate (Action 1.B.1), registration fee changes (e.g., Actions 1.B.2, 2.A.4), fuel surcharges (e.g., Actions 2..4, 2.A.5) that could be redirected as a dedicated funding source.
6. Timeframe for Implementation: Timeframe for implementation will be tied to the legislative process.
 7. Anticipated Timeframe of Outcome: Availability of increased funding could result in short-term improvements in transit service and support longer-term expansions and additions – providing some immediate and greater longer-term reductions in VMT and GHG contributions.

Program Evaluation

1. Estimated CO₂ Emission Reductions: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low (to be subject of study)
 - ii. Timing of Benefit:
 - iii. Impacts:
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism; not individually quantified
 - ii. Timing of Benefit:
 - iii. Impacts: Evenly distributed
3. Other Benefits/Impacts:
 - a. *Environmental:* Reduced VMT would – in addition to reducing GHGs – reduce air, noise and water pollution associated with roads and highways; public transportation could support more compact, low GHG-impact development.
 - b. *Health:* Reduced VMT would reduce air pollution associated with roads and highways. Increased public transportation could support more healthy, walkable development patterns.
 - c. *Social:* Enhancing public transportation will provide greater transportation choice and help meet the needs of the growing elderly population and individuals who cannot afford a personal vehicle.
 - d. *Other*
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical:* There are no technical barriers or challenges to implementing this measure.
 - b. *Economic:* This measure could have economic impacts on individuals paying the taxes or fees that support the dedicated fund, though those impacts may be reduced for many as a result of behavior modification/reduced VMT. This measure will create powerful economic development opportunities associated with transit-oriented development.
 - c. *Statutory/Regulatory:* Establishing a dedicated fund could involve political challenges, the difficulty of which may vary depending on the funding source(s).
 - d. *Social:*
5. Other Factors of Note:
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the very near-term to achieve significant reductions in CO₂ emissions from the transportation and land use sector.
7. References:

TLU Action 2.B.2.d – Implement Recommendations of I-93 Transit Investment Study

Summary

Implement the recommendations of the I-93 Transit Investment Study, which NHDOT expects to finalize in the Summer of 2008. The I-93 Transit Investment Study is an effort to identify a long-term vision of transit investments that are needed and feasible to accommodate and diversify future travel demand in the I-93 corridor from Boston to Manchester. Rail, bus, and ridesharing strategies are being investigated to promote alternatives to single-occupant vehicle (SOV) travel within the corridor.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The NH Department of Transportation is currently in the process of completing the I-93 Transit Investment Study. The study began in August 2006 and will be completed in the summer of 2008. The study will include three phases. Phase 1 will develop a Purpose and Need Statement, set goals and objectives, identify issues, develop and implement a Public Involvement Plan, collect and analyze data, and develop the initial alternatives. Phase 2 will include refining alternatives, developing draft recommendations, and developing the travel demand model and alternative analysis. Phase 3 will include developing and presenting a strategic plan. Successful completion of the I-93 Transit Investment Study will require the appropriate balance among three critical elements:
 - A multi-jurisdictional decision-making process, built on
 - Sound technical analysis, and informed by
 - An effective public/stakeholder involvement strategy.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: The Department of Transportation and the Federal Highway Administration have authorized this study. Implementation of a selected alternative would require additional funding for construction of infrastructure to support the selected alternative.
 - b. *Resources Required*: Policy implementation will require capital expenditure.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Public acceptance
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: State DOT and FHWA, in coordination with Public Safety (State Police)
 - b. *Parties Paying for Implementation*: NHDOT / NH Rail Authority
 - c. *Parties Benefiting from Implementation*: Commuters using the selected alternative, drivers enjoying reduced levels of congestion.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Existing Bus service on I-93.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*: Park-and-ride facilities that encourage use of bus services.
 - b. *Proposed*: Expanded park-and-ride facilities and increased bus services; all TLU 2A and 2B actions.
6. Timeframe for Implementation: Dependent on the alternative selected.
 - Bus on shoulder, 6-12 months.
 - Commuter rail on Manchester and Lawrence (M & L) Branch, several years.

7. Anticipated Timeframe of Outcome: Immediate effect upon implementation; growing impact over time.

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- | | |
|------------------------|--------------------------------|
| a. Short-term (2012): | 0.12 MMTCO ₂ e/year |
| b. Medium-term (2025): | 0.13 MMTCO ₂ e/year |
| c. Long-term (2050): | 0.17 MMTCO ₂ e/year |

2. Economic Effects:

a. Costs:

- | | |
|-------------------------|----------------------------------|
| i. Implementation Cost: | Moderately high |
| ii. Timing: | Immediate / higher initial costs |
| iii. Impacts: | Evenly distributed |

b. Savings:

- | | |
|--------------------------------|---|
| i. Potential Economic Benefit: | Supporting mechanism; not individually quantifiable |
| ii. Timing: | |
| iii. Impacts: | Evenly distributed |

3. Other Benefits/Impacts:

See Litman, Todd. *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, Victoria Transport Policy Institute, January 2008. Table 3.1 provides a listing of potential social costs and benefits associated with transit investments, including (among others) mobility and travel efficiency improvements, health benefits, and economic development gains. He estimates a benefit/cost ratio of 1.8 for current bus service for a case study analysis of a medium-sized city (p.84).

The alternatives available within the I-93 Transit Investment Study, when compared to each other, all have a range of benefits. These benefits that are achievable are relatively cost-effective, and reasonable with the conservation of the environment in mind, however, not all the alternatives pose the same benefits. Bus related alternatives are fairly less costly to implement when compared to some of the other alternatives such as rail or a dedicated HOV lane. However, bus alternatives are far more limited in passenger capacities when compared to a rail transit alternative. Nevertheless, all the alternatives have a common purpose that results very similar benefits. The direct benefits include reduced travel times, which results reduce vehicle emissions, and increased service reliability. Indirect benefits may include reduced highway congestion, increased transit service, increased transit patronage, and decreased operational costs.

- a. *Environmental*: This action would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
- c. *Social*: Increased opportunity for transit to and from Boston metro; reduced travel time using transit.
- d. *Other*:

4. Potential for Implementation:

- a. *Technical*: Minimal technical challenges.

- b. Economic: There is significant cost associated with this measure.
- c. Statutory/Regulatory: No Statutory Changes anticipated (except perhaps for funding); regulatory approvals required.
- d. *Social*: acceptance requires the encouragement of transit use.

5. Other Factors of Note:

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

- <http://www.i93transit.org/>.
- Litman, Todd. *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, Victoria Transport Policy Institute, January 2008.

TLU Action 2.B.2.e – Expand Park-and-Ride Infrastructure

Summary

Expand and improve New Hampshire's park-and-ride infrastructure to support public bus transit and carpooling by 1) creating new park-and-ride lots in new locations, 2) expanding existing facilities nearing capacity, 3) improving the services provided at these facilities (e.g., improved shelters and restroom facilities, increased security, walkable connections to adjoining developed land uses), and 4) expanding marketing efforts to promote use of the facilities.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The availability of high-quality park-and-ride lots can facilitate car/van pooling and transit use by providing a convenient location for riders to connect to these alternative travel options. In our rural/suburban state, the availability of park-and-ride lots is essential to providing effective inter-city bus service. Increases in car/van pooling and transit use would reduce single-occupancy vehicle trips, thus reducing VMT and carbon emissions associated with travel.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: NHDOT, Metropolitan Planning Organizations, Regional Planning Commissions, and local municipalities identify locations for new and expanded facilities.
 - b. *Resources Required*:
 - NHDOT/MPO/RPC staff time (may require additional staff to significantly expand # areas)
 - Funding for studies to evaluate future location alternatives
 - Capital investment in land and infrastructure (e.g., paving, facilities):
 - Marketing expenses
 - Operating and maintenance expenses
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Local acceptance of facilities; environmental constraints.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: NHDOT and local municipalities.
 - b. *Parties Paying for Implementation*: State government (with possible availability of Federal matching funds).
 - c. *Parties Benefiting from Implementation*: New Hampshire's population as a whole would benefit from reduced vehicle travel and air pollution as would commuters and travelers more specifically.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): New Hampshire currently has 28 park-and-ride locations with over 4,000 parking spaces (with an average of 56 percent usage). Five additional park-and-ride facilities are planned to be added from 2008 to 2011 (adding over 1,600 spaces), and two facilities expanded (adding 400 spaces). Most of these added/expanded facilities are along the southern I-93 corridor. NHDOT is also considering new park-and-rides at six additional locations and expanding all current lots with fewer than 50 spaces. Current larger facilities at Londonderry and Portsmouth, which provide a higher level of amenities and high frequency of bus service, generate a high level of demand.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - Establishment and enhancement of local transit service to connect riders to park-and-ride facilities.
 - Inter-city bus service from additional park-and-ride facilities (particularly along I-93, I-95, Rt. 16, and Rt. 101 – NHDOT 2003).

- Transportation Management Associations, which organize van pools and coordinate other local/inter-city transit options.
 - Compact, mixed-use, walkable development in the vicinity of park-and-ride to facilitate further reductions in VMT (eliminating additional travel by having access to other needs within walking distance of park-and-ride) and increase access of residents to park-and-ride.
 - Policies that increase the cost of using a vehicle for travel (e.g., increased gas prices, higher parking charges, VMT-based insurance and/or registration).
 - Programs that promote carpool/vanpools: rideshare program, commuter-trip reduction programs by businesses, and Transportation Management Associations.
6. Timeframe for Implementation: Improvements to existing park-and-ride areas and additions of new park-and-ride areas would be established over time beginning in 2010-2012 as state funding becomes available (could possibly be matched with federal funding). The potential to establish new intercity-bus service from existing and new park-and-ride would be evaluated on a case-by-case basis.
7. Anticipated Timeframe of Outcome: Reductions in VMT would be realized as soon as new park-and-ride areas are established, and would be expected to increase over time as the availability of the area is marketed and if complementary policies are put in place (e.g., increased bus service).

Program Evaluation

1. Estimated CO₂ Emission Reductions:

- | | |
|------------------------|--------------------------------|
| a. Short-term (2012): | 0.03 MMTCO ₂ e/year |
| b. Medium-term (2025): | 0.04 MMTCO ₂ e/year |
| c. Long-term (2050): | 0.05 MMTCO ₂ e/year |

2. Economic Effects:

- | | |
|--------------------------------|---|
| a. Costs: | |
| i. Implementation Cost: | Moderate |
| ii. Timing: | Constant / even |
| iii. Impacts: | |
| b. Savings: | |
| i. Potential Economic Benefit: | Supporting mechanism; not individually quantifiable |
| ii. Timing: | |
| iii. Impacts: | Consumer – evenly distributed |

3. Other Benefits/Impacts:

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. It may also increase use of more active travel modes (walk/bike) for part of trip, improving health of individuals.
- c. *Social*:
- d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: High. NHDOT has successfully established multiple park-and-ride areas across NH and has a planned program of continued expansion. It is slightly more difficult to identify and implement appropriate strategies to increase usage (e.g., marketing, improving facilities, establishing bus service), although a user survey for NHDOT 2003 identified several possible types of improvements.
 - b. *Economic*: Moderate. Adequate funding is a challenge, although it is relatively less costly to establish a park-and-ride facility than other transportation infrastructure improvements.
 - c. *Social*: Moderate. Marketing required to increase usage (e.g., educate public on availability, convenience, benefits/cost savings).
 - d. *Statutory/Regulatory*: Moderate / low. Likely requires legislative action to secure required funding. There may be existing policies that limit implementation (e.g., restrictions that limit connections between state-owned park-and-ride areas and adjoining properties).
5. Other Factors of Note: Implements recommendations from NH Department of Transportation 2003 study, *New Hampshire Statewide Intermodal Transportation Planning Study*, regarding recommending expansions and improvements of existing facilities as well as adding additional park-and-ride lots at new locations.

One possible strategy is to develop a few larger, full-service facilities serving key travel markets (which can be expected to generate higher levels of usage and support high-frequency bus service), along with strategically-located (*i.e.*, visible from a highway and/or co-located with other facilities, such as a train station) smaller facilities along most major travel corridors connecting NH's "economic centers."

NHDOT 2003 identified four locations for park-and-rides outside the I-93 corridor that could potential support commuter bus service to Boston: Dover, Exeter, Merrimack, and Seabrook (although the three eastern locations would overlap in area served as well as compete with the existing facility at Portsmouth). Hampton is another potential location to add increased bus service (NHDOT communication).

Inter-city bus service along the I-95 corridor in Coastal NH is currently constrained by a lack of sufficient capacity of current park-and-ride lots.

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
 - NHDOT, *NH Long Range Transportation Plan: A Framework for Transforming Transportation in New Hampshire*, Public Draft, May 1, 2008.
 - NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008.
 - NH Department of Transportation, *NH Statewide Intermodal Transportation Planning Study*, Final Report. December 2003.

TLU Action 2.B.2.f – Provide Support to Transportation Management Associations

Summary

Provide state-funded technical and financial support to establish and operate Transportation Management Associations (TMAs) in major employment centers/areas within New Hampshire. A Transportation Management Association is a collective non-profit organization of private corporations and public agencies working to reduce traffic congestion, improve mobility and air quality, and educate employers and their employees about transportation alternatives. TMAs can be appropriate vehicles for promoting Commuter Trip Reduction Programs with employers (TLU Action 2.A.1) and establishing/improving local/intra-regional bus services (TLU Actions 2.B.1.a and 2.B.1.b).

Program Description

1. Mechanism (i.e., how the policy or program achieves the desired result): Funding would be provided directly to established transportation management associations or to the regional planning commissions to initiate and support the formation of TMAs in major employment centers/areas within the state (e.g., southern NH, central NH, coastal NH, Keene, Hanover/Lebanon). Membership in a TMA would be open to all companies or agencies, public or private, located in the target area and would be expected to include a variety of private sector businesses, management companies, developers, and transportation professionals, as well as public agencies and local government entities. TMAs can be used to promote commuter trip reduction programs with employers (TLU Action 2.A.1) and to support establishment and/or improvements of local/intra-regional bus services (TLU Actions 2.B.1.a and 2.B.1.b).
2. Implementation Plan (i.e., how to implement the specific policy or program):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Legislative action to dedicated financial support for TMAs or redirect current state spending within NHDOT. If a TMA does not currently exist, a Metropolitan Planning Organization, Regional Planning Commission, or local municipality will be identified to initiate formation of TMAs within major employment centers/regions with support from NHDOT staff.
 - b. *Resources Require*: Funding at significant level per TMA. NHDOT staff time and marketing expenses.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: May be difficult to entice area employers to participate.
3. Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):
 - a. *Parties Responsible for Implementation*: NHDOT, Metropolitan Planning Organizations, Regional Planning Commissions, and local municipalities can initiate formation of TMAs within major employment centers.
 - b. *Parties Paying for Implementation*: NH government and local business sponsors
 - c. *Parties Benefiting from Implementation*:
 - Commuters – increased travel options
 - Employers – can increase labor availability by reducing constraints to travel
4. Related Existing Policies and Programs (i.e., those that address similar issues without interacting):
5. Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):
 - a. Establishment and enhancement of local/intra-regional transit service and park-and-rides.
 - b. Policies that increase the cost of using a vehicle for travel (e.g., increased gas prices, higher parking charges, VMT-based insurance and/or registration).
 - c. Programs that promote carpool/vanpools: Rideshare program, commuter-trip reduction programs by businesses, and Transportation Management Associations.

6. Timeframe for Implementation: May be a longer-term (future) implementation option, there can be significant barriers to implementation (e.g., how to get employers to participate) unless initiated by local employers.
7. Anticipated Timeframe of Outcome:

Program Evaluation

1. Estimated CO₂ Emission Reductions: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / Even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism; not individually quantifiable
 - ii. Timing:
 - iii. Impacts: Evenly distributed
3. Other Benefits/Impacts:
 - a. *Environmental*: This action would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: Methods of reducing energy and alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.
 - d. *Other*:
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: High, particularly where TMAs currently exist.
 - b. *Economic*: Costs will be a factor that must be addressed.
 - c. *Statutory/Regulatory*: Legislative action possible required to direct funding.
 - d. *Social*: It may be challenging to entice employers to participate in the program.
5. Other Factors of Note: Has been successful in certain areas – Massachusetts, NH Upper Valley (with strong sponsorship by Dartmouth College and Dartmouth-Hitchcock Hospital). Several areas in NH have struggled to form and/or maintain effective TMAs (Concord area, Portsmouth area, Keene).
6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the mid-term (early 2015), following efforts to increase funding for and expand public transportation to provide additional travel options (“supporting actions” support other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO₂ reductions from the transportation and land use sector).
7. References:

TLU Action 2.B.2.g – Expand Inter-City Bus Service

Summary

Increase access to inter-city bus service for connections in New Hampshire to reduce vehicle travel associated with longer-distance, in-state trips and to help more passengers make connections with other non-vehicle travel modes (e.g., air, rail) for out-of-state travel. Expand inter-city bus service to 1) provide service (within 10 miles) to all communities of greater than 5,000 population and along corridors with 10,000+ average daily traffic, 2) provide service to key destinations (e.g., Manchester airport), and 3) provide connections between significant economic centers in New Hampshire and to areas that develop with sufficient density and uses as to make transit service practicable.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Current inter-city bus service in New Hampshire focuses on connections to Boston. Increased access to inter-city bus service for connections within New Hampshire would reduce vehicle travel associated with longer-distance, in-state trips and would help connect more passengers to other non-vehicle travel modes (e.g., air, rail) for out-of-state travel. It is assumed that new inter-city bus service would be introduced at a minimum level of service (e.g., 2 roundtrips per day) and supported by the necessary marketing/promotion. The level of service would be increased over time to increase ridership.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: NHDOT and commercial bus companies work together to identify new routes, provide infrastructure and put service agreements in place.
 - b. *Resources Required*:
 - NHDOT staff time (may require additional staff to establish service)
 - Funding to conduct required studies
 - Capital investment in infrastructure (e.g., buses, terminals)
 - Operating subsidy
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Requires significant public investment and potential operating subsidy in the near term.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: NHDOT and commercial bus carriers
 - b. *Parties Paying for Implementation*: NH government, passengers using service (possibly Federal subsidy/funding available also).
 - c. *Parties Benefiting from Implementation*:
 - NH population as a whole benefits from reduced vehicle travel and air pollution
 - NH population benefits from improved access to bus service for longer-distance travel (potential individual cost savings for such travel)
 - NH “transit needy” residents are better served (including disabled and economically disadvantaged populations)
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Including new services to begin in 2008, New Hampshire currently has some level of inter-city bus service connecting about 21 locations, with approximately 60-65 round trips per day (predominantly with service to Boston), and an estimated annual ridership of about 1.5 million passenger trips (one-way). Policies to sustain and improve current service can help support extension of service to additional routes.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. Policies that provide funding to support bus, rail, and bike/pedestrian transportation improvements (see Action 2.C.2.c discussion on options for dedicated funding for public transit).
 - b. Provision of an adequate number and sized park-and-ride facilities is an essential component of successful inter-city bus service in a rural/suburban area such as NH.
 - c. Enhancement of inter-city bus service (e.g., increased service, terminals, improved marketing/informational resources).
 - d. Establishment and enhancement of local transit service and additional rural “feeder” services to connect riders to inter-city service.
 - e. Establishment of additional intermodal centers connecting inter-city bus service to local bus service and rail, when available.
 - f. Compact, mixed-use, walkable development in the vicinity of transit access points can facilitate further reductions in VMT (eliminating additional travel by having access to other needs as well as transit) and increase access of residents to inter-city transit service.
 - g. Policies that increase the cost of using a vehicle for travel (e.g., increased gas prices, higher parking charges, VMT-based insurance and/or registration).
6. Timeframe for Implementation: New services could be phased in over time beginning in 2010-2012 as state funding becomes available (could possibly be matched with federal funding). Implementing service connecting the seacoast (Dover/Portsmouth) and Manchester airport as well as adding stops on existing North-South routes to Manchester airport would be initial priorities. New intercity-bus service could continue to be added for additional corridors as those areas develop with adequate population and compact development to support transit service.
7. Anticipated Timeframe of Outcome: Reductions in VMT would be realized as soon as new service is implemented, and would be expected to increase over time as service is improved and marketed and complementary policies put in place to increase ridership.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Quantified together with TLU Action 2.B.1.h
2. Economic Effects:
 - a. Costs:

i. Implementation Cost:	Moderately low
ii. Timing:	Constant / even
iii. Impacts:	Consumer – evenly distributed
 - b. Savings:

i. Potential Economic Benefit:	Moderately low
ii. Timing:	Constant / even
iii. Impacts:	Consumer - evenly distributed

3. Other Benefits/Impacts:

See Litman, Todd. *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, Victoria Transport Policy Institute, January 2008. Table 3.1 provides a listing of potential social costs and benefits associated with

transit investments, including (among others) mobility and travel efficiency improvements, health benefits, and economic development gains. He estimates a benefit/cost ratio of 1.8 for current bus service for a case study analysis of a medium-sized city (p.84).

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
- b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. It may also increase use of more active travel modes (walk/bike) for part of trip, improving health of individuals.
- c. *Social*: Improved mobility for “transit needy” populations (increased need for travel alternatives from rural areas with rising gas prices). Rural connection provides a benefit to the long-distance commuter and those seeking services (e.g., medical services). Important component of balanced, multi-modal transportation system.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical*: Moderate. NHDOT has successfully worked with service providers to establish new bus service elsewhere in NH, however, bus companies have to be interested.
- b. *Economic*: Moderate / low. Adequate funding is a challenge (NH currently lacks sufficient funds for matching federal \$ available for transit). Requires new, sustainable funding source to establish and maintain service.
- c. *Statutory/Regulatory*: Moderate / low. Likely requires legislative action to secure required funding.
- d. *Social*: Moderate. Marketing required to generate ridership (e.g., educate public on availability, convenience, access to system, benefits) and reduce view of bus travel as inferior to SOV travel.

5. Other Factors of Note:

Although this action by itself was estimated to result in relatively small reductions in VMT (because of the focus on providing service to more rural areas and the very low assumptions regarding % of population utilizing the new service), there are substantially greater reductions available in expanding inter-city bus service as part of a comprehensive multi-modal transportation investment program. Complementary policies that facilitate people making use of inter-city bus service (such as local transit to allow them to easily reach their final destination) could result in substantially higher levels of ridership.

The action is based on a NHDOT 2003 study, which found that just six towns over 5,000 population are ten miles or more from existing intercity service (based on 2000 Census data). About 20 towns with populations between 2,000-4,999 are more than 10 miles from existing service. NHDOT 2003 identified several travel corridors with greater than 10,000 ADT, including Route 101 from Milford to Hampton, Route 108 between Exeter and Dover, and Route 125 from Epping to Lee (as well as other localized road portions). NHDOT 2003 also identified a lack of service between various points in New Hampshire to Manchester Airport, Intercity passenger rail, and major medical facilities. From this assessment, NHDOT 2003 analyzed nine options to provide service to unserved corridors in the southwest (Keene to Manchester), southeast (Dover to Manchester), north (Colebrook to Littleton), and lakes region (Wolfeboro/West Ossipee to Dover), estimating ridership, revenue and estimated deficit (subsidy required). Service north of Concord and Dover and west of Nashua are likely to require significant public subsidy to maintain.

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the mid-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

- NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008.
- NH Department of Transportation, NH Statewide Intermodal Transportation Planning Study, Final Report, December 2003.
- Carroll County, *NH Transit Operations Expansion, Final Report*. Community Transportation Association of America, November 1, 2007.
- Greater Derry Greater Salem Regional Transportation Council, Rockingham Planning Commission, Southern NH Planning Commission, and Nashua Regional Planning Commission, *Greater Derry Greater Salem Regional Transit Plan*, 2003.
- Nashua Regional Planning Commission, *Transit Plan for the Nashua Region*. December 2003.
- Cooperative Alliance for Seacoast Transportation, www.COASTbus.org, website for bus service to several routes throughout the coastal region of New Hampshire.
- Rockingham Planning Commission and Southern New Hampshire Planning Commission, *Portsmouth-Manchester Airport Bus Feasibility Study – Draft Final Report*, December 2007.

TLU Action 2.B.2.h – Improve Existing Inter-City Bus Service

Summary

Improve the quality of facilities and increase the frequency of service on current inter-city bus services in New Hampshire to increase ridership levels, thus reducing VMT and vehicle-related carbon emissions. Enhancements would include 1) higher-quality bus stops and terminals with additional services and amenities; 2) improved and additional public intermodal facilities, shared with local and other inter-city providers to facilitate connections; 3) increased frequency of service; and (4) better connections to surrounding areas through improved walkability and easier access to local transit.

Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* This action would significantly increase ridership levels, thus reducing single-occupancy vehicle travel, vehicle miles traveled, and vehicle-related carbon emissions. Improvements to existing facilities and establishment of new intermodal facilities – to create better inter-city and local transit connections – would increase ridership on inter-city routes as well as on other systems.
2. *Implementation Plan (i.e., how to implement the specific policy or program):*
 - a. *Method of Establishment (e.g., legislation, executive order):* NHDOT and commercial bus companies work together to identify and implement appropriate improvements and increases in service.
 - b. *Resources Required:*
 - NHDOT staff time (may require additional staff to establish service)
 - Funding to conduct required studies
 - Public investment in infrastructure (e.g., additional buses and upgraded terminals)
 - Operation and maintenance cost (public subsidy)
 - c. *Barriers to Address (especially for medium to low feasibility actions):* Requires significant public investment and potential operating subsidy in the near term.
3. *Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):*
 - a. *Parties Responsible for Implementation:* NHDOT and commercial (local and inter-city) bus carriers.
 - b. *Parties Paying for Implementation:* NH government, passengers using service (possibly Federal matching funding available), commercial bus companies.
 - c. *Parties Benefiting from Implementation:*
 - NH population as a whole would benefit from reduced vehicle travel and air pollution.
 - NH population would benefit from improved access to bus service for longer-distance travel (potential individual cost savings for such travel)
 - NH “transit needy” residents (including disabled and economically disadvantaged populations) would see improved service.
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):* Including new services to begin in 2008, New Hampshire currently has some level of inter-city bus service connecting about 21 locations, with approximately 60-65 round trips per day (predominantly with service to Boston), and an estimated ridership of about 1.5 million passenger trips (one-way). NH currently has 11 existing intermodal facilities, which are in excellent condition and offer high level passenger amenities (NHDOT 2003).

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. Provision of an adequate number and sized park-and-ride facilities is an essential component of successful inter-city bus service in a rural/suburban area such as NH.
 - b. Policies that provide funding to support bus, rail, and bike/pedestrian transportation improvements (see Action 2.C.2.c discussion on options for dedicated funding for public transit).
 - c. Establishment and enhancement of local transit service and additional rural “feeder” services to connect riders to inter-city service.
 - d. Establishment of additional intermodal centers connecting inter-city bus service to local bus service and rail, when available.
 - e. Compact, mixed-use, walkable development in the vicinity of transit access points can facilitate further reductions in VMT (eliminating additional travel by having access to other needs as well as transit) and increase access of residents to inter-city transit service. Promoting joint uses of intermodal transportation centers, such as retail shops and food.
 - f. Policies that increase the cost of using a vehicle for travel (e.g., increased gas prices, higher parking charges, VMT-based insurance and/or registration).
6. Timeframe for Implementation: New services could be phased in over time beginning in 2010-2012 as state funding becomes available (could possibly be matched with federal funding).
7. Anticipated Timeframe of Outcome: Reductions in VMT would be realized as soon as improvements are implemented and ridership increases. VMT reductions would be greater over time as service is further improved and marketed and complementary policies put in place to increase ridership.

Program Evaluation

1. Estimated CO₂ Emission Reductions:
 - a. Short-term (2012): 0.01 MMTCO₂e/year
 - b. Medium-term (2025): 0.02 MMTCO₂e/year
 - c. Long-term (2050): 0.15 MMTCO₂e/year
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Moderately low
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer – evenly distributed
 - b. Savings:
 - i. Potential Economic Benefit: Moderately low
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer – evenly distributed
3. Other Benefits/Impacts:

See Litman, Todd. *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, Victoria Transport Policy Institute, January 2008. Table 3.1 provides a listing of potential social costs and benefits associated with transit investments, including (among others) mobility and travel efficiency improvements, health benefits, and economic development gains. He estimates a benefit/cost ratio of 1.8 for current bus service for a case study analysis of a medium-sized city (p.84).

- a. *Environmental*: This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. It may also increase use of more active travel modes (walk/bike) for part of trip, improving health of individuals.
 - c. *Social*: Improved quality of transit travel experience and user convenience, e.g., less “dead” time between connections. Intermodal transit centers can provide a focal point for a community, provide an easily-identifiable location for all transportation information, and be an important component of economic development within a community. Improved mobility for “transit needy” populations (increased need for travel alternatives from rural areas with rising gas prices). Rural connection provides a benefit to the long-distance commuter and those seeking services (e.g., medical services). Important component of balanced, multi-modal transportation system.
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
- a. *Technical*: High / moderate. NHDOT has successfully worked with service providers to establish new bus service elsewhere in NH, however, bus companies have to be interested.
 - b. *Economic*: Moderate / low. Adequate funding is a challenge (NH currently lacks sufficient funds for matching federal \$ available for transit. At the upper end of investment levels, there may be challenges in obtaining enough federal funds). Requires new, sustainable public funding source to establish and maintain upgraded facilities and service. It is very difficult to raise private capital to invest in terminals (NHDOT 2003), particularly multi-modal/inter-modal facilities serving multiple carriers.
 - c. *Statutory/Regulatory*: Moderate / low. Likely requires legislative action to secure required funding.
 - d. *Social*: Moderate. Marketing required to generate ridership (e.g., educate public on availability, convenience, access to system, benefits) and reduce view of bus travel as inferior to SOV travel.
5. Other Factors of Note:

There are substantially greater reductions available in improving inter-city bus service as part of a comprehensive multi-modal transportation investment program. Complementary policies that facilitate people making use of inter-city bus service (such as easy access to local transit to allow them to easily reach their final destination, or co-location of other services) could result in substantially higher levels of ridership.

NH Department of Transportation 2003 study, *New Hampshire Statewide Intermodal Transportation Planning Study*, recognized that NH had gone further in its policy of establishing public intermodal terminals than any state in the country, with public intermodal terminals in Concord, Dover, Manchester, Nashua, Keene, Portsmouth, and Manchester Airport, as well as publicly-owned park-and-ride facilities and other public locations. This action includes implementation of the recommendations from this study that would improve ridership on inter-city buses, including upgrading passenger amenities (e.g., shelters, restrooms, information) at 21 bus stops, and establishing intermodal facilities in Hanover, Londonderry, Plymouth, and Meredith. Durham, New London, and Keene were also identified as potential candidates for new intermodal/multi-modal facilities (NHDOT 2003). Durham facility is being upgraded to provide a true multi-modal function (bus and rail). This action further calls for continuing investments in passenger amenities at additional stops and establishing additional intermodal facilities over time in areas that meet the recommended criteria.

New intercity-bus service facilities are currently under construction at Londonderry, Salem, and Dover. Durham facility is being upgraded to provide a true multi-modal function (bus and rail).

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:
 - NHDOT, Draft Final Bus Transit Needs and Benefits Analysis for Long-Range Transportation Plan – Technical Memo, 2008.
 - NH Department of Transportation, NH Statewide Intermodal Transportation Planning Study, Final Report, December 2003.

Draft

TLU Action 2.C.1.a – Assess GHG Development Impact Fees

Summary

For any new development project seeking a state permit, assess a state impact fee based on the estimated greenhouse gas impact of the project, and/or enable municipalities to adopt similar programs. The size of the impact fee would be determined from the estimated transportation demand generated by the project and would be administered through a statewide permit program. The new impact fees would encourage development that has lower GHG impacts, e.g., projects designed around compact, mixed-use, walkable environments in existing community centers. Funds raised through impact fees could be used to support public transit or promote other GHG offsets with the goal of achieving “carbon neutrality” or, at the very least, reduced carbon footprints for new state-permitted development projects.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Introduce a statewide permit program to assess a transportation-based GHG Development Impact Fee to encourage responsible, pedestrian- and transit-oriented development projects. GHG emissions would be calculated on the basis of the change in VMT associated with any new development. Impact fees could be used for expansion of public transit and other enhancements to reduce overall GHG emissions.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. Method of Establishment (*e.g., legislation, executive order*):
 - Pass enabling legislation to require a transportation-based GHG emission permit for projects that will generate above a certain VMT threshold (or number of trips per day). This could be done by a revision to the current State Driveway Permit program under RSA 236:13, or applied to any project (of a certain size) requiring a state permit.
 - The landowner or developer where such a project is proposed will be required to quantify the change in mobile-source GHG emissions caused by the project and submit such calculations for review.
 - Develop rules to determine GHG emission impact fees that such developments must pay to offset any increase in mobile-source emissions caused by the new development. These impact fees could be set aside to establish or expand transit use and implement other transportation enhancements to reduce VMT or congestion on the roadway corridors affected by the development.
 - Impact fees could be reduced or waived for developments within existing community centers by an appropriate revision to RSA 674:21.
 - b. Resources Required: Initial costs will include approximately 0.5 FTE staff for one year to setup a new statewide GHG program and coordinate on-going implementation, including reviews of project-specific technical studies and setting fee levels (could be a reduced on-going staff commitment depending on the number of permits to which the impact fee is applied). After initial setup, the new program will be self-funded by developers through permit fees.
 - c. Barriers to Address (*especially for medium to low feasibility actions*):
 - Lack of familiarity with standards, measurements, and technology of GHG emissions related to land use
 - Introduction of a new statewide permit program
 - Compliance and coordination with overlapping federal regulations
 - Concerns over equal protection and loss of development rights of property located within and outside of existing community centers.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* Legislature, State Agencies, and Municipalities
 - b. *Parties Paying for Implementation:* Proponents of new developments and redevelopment projects. State government would pay for initial program development, e.g., process development, rulemaking.
 - c. *Parties Benefiting from Implementation:* In addition to general benefits, developers of qualifying low-GHG projects will benefit from faster permit processing timeframes, less uncertainty in obtaining approvals, and lower costs to secure approvals. Communities will benefit from increased redevelopment of existing core areas by increased tax revenues and better utilization of existing infrastructure. Communities and planning agencies will have an objective tool to encourage the protection of open space while allowing the expansion of housing, employment, and goods and services in an environmentally sound manner.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
 - a. Federal environmental laws (e.g. Clean Air Act, Clean Water Act, Endangered Species Act)
 - b. NHDES Regulatory Programs (e.g. Wetlands, Brownfields, Shoreland Protection)
 - c. NHDOT Driveway Permit Program
 - d. Municipal Zoning Ordinances
 - e. Municipal Impact Fee Ordinances
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:* RSA 79(E): Tax abatement for significant rehabilitation of structures within designated areas.
 - b. *Proposed:*
 - TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking
 - TLU Action 2.B.1.a – Expand Local/Intra-Regional Transit (Bus) Service
 - TLU Action 2.B.1.b – Improve Existing Local/Intra-Regional Transit (Bus) Service
 - TLU Action 2.B.1.c – Expand and Improve Bicycle and Pedestrian Infrastructure
 - TLU Action 2.B.2.a – Maintain and Expand Passenger Rail Service
 - TLU Action 2.B.2.b – Maintain and Expand Freight Rail Service
 - TLU Action 2.B.2.c – Implement a Stable Funding Stream to Support Public Transportation
 - TLU Action 2.B.2.e – Expand Park-and-Ride Infrastructure
 - TLU Action 2.B.2.g – Expand Inter-City Bus Service
 - TLU Action 2.B.2.h – Improve Existing Inter-City Bus Service to Increase Ridership
 - TLU Action 2.C.1.b – Streamline Approvals for Low-GHG Development Projects
 - TLU Action 2.C.3 – Develop Model Zoning for Higher-Density, Mixed-Use Development
 - TLU Action 2.C.4 – Use State Funding and Grants to Encourage Low-GHG-Impact Development
 - TLU Action 2.C.5 – Enable/Apply a Two-Rate Tax Structure Based on GHG Impacts
 - TLU Action 2.C.7 – Establish Entity(ies) to Support Compact Land Use Patterns and Open Space Preservation
 - TLU Action 2.C.8 – Continue/Expand Funding, Education, and Technical Assistance to Municipalities
6. Timeframe for Implementation: Appropriate legislation could be introduced in the next legislative session. Rule-making, permit program setup, and project implementation can be expected to begin in 2010. Municipalities can be expected to take the necessary actions gradually within the next two to five years thereafter.
7. Anticipated Timeframe of Outcome: Land Use regulations are by definition long-term in nature. New Hampshire's traditional "community center" form of land use began to change in the mid-20th century. In the past 50 years, a rapid increase in road-building and broad introduction of segregated zoning districts has led to sprawl and the current dependence on the single-occupant automobile.

It is expected that the New Hampshire economy will expand between 80% and 100% in the next 50 years. Therefore, the state will have the opportunity to rebuild itself completely during this period. Therefore, a return to a mixed-use community-center model can have a substantial impact on the character of our communities and the per capita VMT necessary to live, work, shop, learn, and recreate in New Hampshire.

Program Evaluation

1. Estimated CO₂ Emission Reductions: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism only
 - ii. Timing of Benefits:
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: By promoting development in mixed-use community centers, development pressure on greenfield sites (sprawl) will be reduced, and preservation of open space and the character of the state's remaining undeveloped areas will be enhanced. This would also reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social*: Benefits attendant to VMT reduction through higher-density, integrated land use patterns.
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Although the technical resources already exist and are generally well understood, the new program will require substantial outreach to the development community for understanding and acceptance.
 - b. *Economic*: After program setup, the costs to the state will be nominal. Costs to developers to prepare technical studies can be minimized by detailed regulatory guidance on estimating impacts and may be partially offset by savings from streamlined permitting of low-GHG impact projects.
 - c. *Statutory/Regulatory*: New legislation and new agency administrative rules will be required.
 - d. *Social*: The action is anticipated to have good public support, but could face some resistance from development community.
5. Other Factors of Note:
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO₂ emissions from the transportation and land use sector.

7. References:

a. *California SB97*

The California legislature is considering legislation to encourage local jurisdictions to evaluate and reduce increases in greenhouse gas emissions caused by their land use decisions. Feasible mitigations measures related to transportation include:

- High-density developments that reduce vehicle trips and utilize public transit.
- Transportation impact fees on developments to fund public transit service.
- Regional transportation centers where various types of public transportation meet.

b. *US EPA Smart Growth Studie*

The U.S. Environmental Protection Agency (EPA) sponsored a case-study comparison of a smart growth community (Metro Square) in Sacramento, California, and two conventional suburban developments. The research found that the pattern of development had a significant impact on transportation. The residents of Metro Square were four times as likely to accomplish daily tasks by walking and take only half as many driving trips, driving a total of 40 percent to 50 percent fewer miles. (1)

Another study compared an infill development in an urban, walkable, transit-friendly neighborhood of Atlanta—the Atlantic Steel site—to hypothetical developments of the same square footage in three suburban, sprawl locations in the Atlanta metropolitan area. The modeling estimated that the Atlantic Steel site would result in 22 percent to 62 percent lower CO₂ emissions per year than the sprawl sites. (2)

¹ Kaid Benfield, “Environmental Characteristics of Smart Growth Neighborhoods: An Exploratory Case Study” (New York, NY: Natural Resources Defense Council, October 2000).

² U.S. Environmental Protection Agency, Transportation and Environmental Analysis of the Atlantic Steel Development Project, prepared by Hagler Bailly, Inc., November 1, 1999.

c. *Minneapolis Zoning Code – Travel Demand Management Plan*

The City Zoning Code requires non-residential developments with new or additional gross square feet of 100,000 or more to include a travel demand management (TDM) plan. This plan is to address the transportation impacts of the development on air quality, parking, and roadway infrastructure. It also is to identify measures to minimize transportation impacts of the development. These TDM Plans include methods to encourage and coordinate carpooling among tenants and employees. There is also a zoning ordinance regarding bicycle facilities requirements in new developments of over 500,000 square feet or more of new or additional gross floor space in downtown districts.

TLU Action 2.C.1.b – Streamline Approvals for Low-GHG Development Projects

Summary

Adopt new policies to streamline permit review processes, apply alternative requirements, or otherwise reduce barriers for development projects in *existing* community centers with low-GHG footprints. Conduct a broad evaluation of state permit processes and requirements to identify barriers that now deter development from locating in low-GHG impact areas – including existing downtowns and community centers – and develop practical solutions to removing such barriers. Encourage municipalities to adopt similar strategies in their development ordinances and permit processes.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Facilitate regulatory approvals by state agencies for land development projects having low-GHG footprints.
 - a. To qualify for preferential review standards, the development project would need to meet four criteria:
 - Be located within a defined low-GHG impact development area (e.g., see TLU Actions 2.C.3 and 2.C.2),
 - Achieve acceptable goals of density and land use,
 - Incorporate pedestrian- and transit-oriented facilities, and
 - Demonstrate a verifiable GHG reduction over an alternative design or location.
 - a. For projects that qualify, preferential review standards could include, for example:
 - *GHG Impact Fees*. Waive GHG impact fees for qualifying projects (see TLU Action 2.C.1.a).
 - *Wetlands*. Reduce mitigation and setback requirements for qualifying projects. Create a standing “General Permit” for qualifying projects below a certain threshold of proposed fill.
 - *Rare/Endangered Species*. Allow regulators to exclude designated areas from “critical habitat” definitions for certain listed species.
 - *Shorelands*. Waive or reduce setback distances for qualifying projects.
 - *NHDOT Driveway Permits*. Expedite permits for qualifying projects. Waive or reduce permit fees based on future VMT reductions associated with pedestrian- and transit-oriented development features in qualifying projects.
 - *Local Traffic Impact Fees*. Allow regulators to offset traffic impact fees by considering future VMT reductions associated with pedestrian- and transit-oriented development features in qualifying projects.
 - *Priority Tracking*. For projects that qualify, establish a priority track for faster processing of permits and approvals.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*:
 - i. Pass legislation to establish a GHG program within OEP or DES to work with existing permit programs and make rules to define the following:
 - Low-GHG impact development areas (see also TLU Actions 2.C.2 and 2.C.3),
 - Qualifying projects
 - Priority processing policies for regulatory agencies
 - General permit guidelines for certain existing regulatory programs
 - Waivers of permit fees for certain existing regulatory programs

- ii. Revise applicable DES and other agency administrative rules to provide for expedited permit review timetables and alternative review standards.
 - b. *Resources Required:* Initial costs would include costs to setup a new GHG program with adequate facilities and staff. After initial setup, the new program would be self-funded by developers through permit fees. The new program staff would work with other regulatory staff to coordinate administrative rules and policies for expedited permit review and alternative review standards.
 - c. *Barriers to Address (especially for medium to low feasibility actions):*
 - i. Introduction of a new statewide permit program and resistance to revisions to existing permit program requirements
 - ii. Compliance and coordination with overlapping federal regulations
 - iii. Lack of familiarity with standards, measurements, and technology of GHG emissions related to land use.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
- a. *Parties Responsible for Implementation:* Legislature, State Agencies, and Municipalities
 - b. *Parties Paying for Implementation:* Initial costs must be provided from general fund revenues. After establishment, costs will be borne by applicants (developers of new Qualifying Projects).
 - c. *Parties Benefiting from Implementation:* In addition to general benefits, developers of qualifying low-GHG projects will benefit from faster permit processing timeframes, less uncertainty in obtaining approvals, and lower costs to secure approvals. Communities will benefit from increased redevelopment of existing core areas by increased tax revenues and better utilization of existing infrastructure.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
- Federal environmental laws (e.g. Clean Air Act, Clean Water Act, Endangered Species Act)
 - NHDES Regulatory Programs (e.g. Wetlands, Brownfields, Shoreland Protection)
 - NHDOT Driveway Permit Program
 - Municipal Zoning Ordinances
 - Municipal Impact Fee Ordinances
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
- a. *Existing*
 - b. *Proposed:*
 - TLU Action 2.A.7 – Create Initiative to Reduce Availability of Free and Inexpensive Parking
 - TLU Action 2.B.1.a – Expand Local/Intra-Regional Transit (Bus) Service
 - TLU Action 2.B.1.b – Improve Existing Local/Intra-Regional Transit (Bus) Service
 - TLU Action 2.B.1.c – Expand and Improve Bicycle and Pedestrian Infrastructure
 - TLU Action 2.B.2.a – Maintain and Expand Passenger Rail Service
 - TLU Action 2.B.2.b – Maintain and Expand Freight Rail Service
 - TLU Action 2.B.2.c – Implement a Stable Funding Stream to Support Public Transportation
 - TLU Action 2.B.2.e – Expand Park-and-Ride Infrastructure
 - TLU Action 2.B.2.g – Expand Inter-City Bus Service
 - TLU Action 2.B.2.h – Improve Existing Inter-City Bus Service to Increase Ridership
 - TLU Action 2.C.1.a – Assess GHG Development Impact Fees
 - TLU Action 2.C.3 – Develop Model Zoning for Higher-Density, Mixed-Use Development
 - TLU Action 2.C.4 – Use State Funding and Grants to Encourage Low-GHG-Impact Development
 - TLU Action 2.C.5 – Enable/Apply a Two-Rate Tax Structure Based on GHG Impacts

- TLU Action 2.C.7 – Establish Entity(ies) to Support Compact Land Use Patterns and Open Space Preservation
- TLU Action 2.C.8 – Continue/Expand Funding, Education, and Technical Assistance to Municipalities

6. Timeframe for Implementation: Appropriate legislation could be introduced in the next legislative session. Rule-making, permit program setup, and program implementation can be expected to begin in 2010. Municipalities can be expected to take appropriate actions gradually within the next two to five years thereafter.
7. Anticipated Timeframe of Outcome: Land Use regulations are by definition long-term in nature. New Hampshire's traditional "community center" form of land use began to change in the mid-20th century. In the past 50 years, a rapid increase in road-building and broad introduction of segregated zoning districts has led to sprawl and the current dependence on the single-occupant automobile.

It is expected that the New Hampshire economy will expand between 80% and 100% in the next 50 years. Therefore, the state will have the opportunity to rebuild itself completely during this period. Therefore, a return to a mixed-use community-center model can have a substantial impact on the character of our communities and the per capita VMT necessary to live, work, shop, learn, and recreate in New Hampshire.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Essential action but not individually quantified; quantified as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:

i. Implementation Cost:	Low
ii. Timing:	Constant / Even
iii. Impacts:	State government
 - b. Savings:

i. Potential Economic Benefit:	Supporting mechanism only
ii. Timing of Benefits:	
iii. Impacts:	
3. Other Benefits/Impacts:
 - a. *Environmental:* By promoting development in mixed-use community centers, development pressure on greenfield sites (sprawl) will be reduced, and preservation of open space and the character of the state's remaining undeveloped areas will be enhanced. This would also reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.
 - c. *Social:* Benefits attendant to VMT reduction through higher-density, integrated land use patterns.
 - d. *Other:*

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Although the technical resources already exist and are generally well understood, the new program will require substantial outreach to the development community for understanding and acceptance.
 - b. *Economic*: After program setup, the costs to the state will be nominal, and will be covered by a new permit fee. Developers of low-GHG impact projects should experience savings over current regulatory processing costs (most notably time cost).
 - c. *Statutory/Regulatory*: New legislation and coordinated changes to numerous Agency administrative rules will be required.
 - d. *Social*: The action is anticipated to have high public support among developers and the general public once it is properly explained and understood.
5. Other Factors of Note:
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO₂ emissions from the transportation and land use sector.
7. References:

- a. *California – SB 97*

The California Attorney General has asked local jurisdictions to evaluate and reduce increases in greenhouse gas emissions caused by land use decisions. Feasible mitigations measures identified by the Attorney General include:

- High-density developments that reduce vehicle trips and utilize public transit.
- Parking spaces for high-occupancy vehicles and car-share programs.
- Electric vehicle charging facilities and conveniently located alternative fueling stations.
- Limits on parking.
- Transportation impact fees on developments to fund public transit service.
- Regional transportation centers where various types of public transportation meet.
- Energy efficient design for buildings, appliances, lighting and office equipment.
- Solar panels, water reuse systems and on-site renewable energy production.
- Methane recovery in landfills and wastewater treatment plants to generate electricity.
- Carbon emission credit purchases that fund alternative energy projects.

Not all of these mitigation measures would work for all projects, but the list provides some examples and ideas that could be adapted to fit the project at issue.

- b. *Smart Growth Case Studies – US EPA*

The EPA sponsored a case-study comparison of a smart growth community (Metro Square) in Sacramento, California, and two conventional suburban developments. The research found that the pattern of development had a significant impact on transportation. The residents of Metro Square were four times as likely to accomplish daily tasks by walking and take only half as many driving trips, driving a total of 40 percent to 50 percent fewer miles. (1)

Another study compared an infill development in an urban, walkable, transit-friendly neighborhood of Atlanta—the Atlantic Steel site—to hypothetical developments of the same square footage in three suburban, sprawl locations in the Atlanta metropolitan area. The modeling estimated that the Atlantic Steel site would result in 22 percent to 62 percent lower CO₂ emissions per year than the sprawl sites. (2)

¹ Kaid Benfield, “Environmental Characteristics of Smart Growth Neighborhoods: An Exploratory Case Study” (New York, NY: Natural Resources Defense Council, October 2000).

² U.S. Environmental Protection Agency, Transportation and Environmental Analysis of the Atlantic Steel Development Project, prepared by Hagler Bailly, Inc., November 1, 1999.

c. *Wisconsin General Laws Chapter 286*

This law provides for the management of emissions of specified greenhouse gases, including carbon dioxide. The law requires the Department of Natural Resources (DNR) to promulgate rules requiring the monitoring and reporting of greenhouse gas emissions by significant sources of those emissions. The law requires DNR to approve a plan, no later than January 1, 2010, for achieving reductions of greenhouse gas emissions that are technologically feasible and cost-effective. The bill authorizes DNR to authorize the use of market-based compliance mechanisms.

d. *Massachusetts General Laws Chapter 40R*

This chapter encourages mixing land uses and increasing the availability of affordable housing by creating a range of housing opportunities in neighborhoods. It takes advantage of compact design, fosters distinctive and attractive communities, preserves open space, farmland, natural beauty and critical environmental areas, strengthens existing communities, provides a variety of transportation choices, makes development decisions predictable, fair and cost effective and encourages community and stakeholder collaboration in development decisions.

TLU Action 2.C.2 – Develop Model Zoning to Support Bus/Rail Transit

Summary

Develop model zoning regulations or standards governing land use around bus/rail service access points to maximize ridership and potential GHG reductions. Encourage, assist, or require municipalities to adopt and implement the model zoning regulations around bus/rail stations. The model language or standards would define criteria for minimum development density, mix of land uses, and an interconnected, walkable street pattern. Grants for specific technical assistance to support implementation could be awarded to communities (under TLU Action 2.C.8) and/or incentives implemented to promote adoption (e.g., access to additional state grants under TLU Action 2.C.4).

Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* The state would establish model land development regulations that promote higher density, mixed-use development (including affordable housing) to maximize ridership and potential GHG reductions associated with the extension/improvement of inter-city bus/rail service. The model regulations could either be offered to a municipality as a voluntary program or required to be in place before bus/rail service would be provided to that community.
2. *Implementation Plan (i.e., how to implement the specific policy or program):*
 - a. *Method of Establishment (e.g., legislation, executive order):* A voluntary program could be established through development of a model ordinance by the Office of Energy and Planning that municipalities could be encouraged to adopt. A mandatory program could be adopted by Executive Order of the Governor, or by separate legislative action, that would be tied to investment in rail and bus service extensions.
 - b. *Resources Required:* A voluntary program could be developed through either OEP or DES with existing or expanded staff resources. A mandatory program would require development of a rail and bus capital and operating expansion program linked by a legal requirement for local adoption of model zoning provisions.
 - c. *Barriers to Address (especially for medium to low feasibility actions):* The mandatory program would require capital and operating funds to implement an expanded rail and bus system.
3. *Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):*
 - a. *Parties Responsible for Implementation:*
 - Voluntary programs: OEP, with others (e.g., DES, Regional Planning Commissions, DOT)
 - Mandatory programs: OEP, with others (e.g., DES, Regional Planning Commissions, DOT)
 - b. *Parties Paying for Implementation:* Development of the model regulations would be absorbed by the designated state agency and municipalities that elected to adopt the model regulations. Mandatory programs would be the responsibility of the designated state agency to develop and monitor the zoning regulations, and NHDOT funding for rail/bus service extensions.
 - c. *Parties Benefiting from Implementation:* Developers, citizens, municipalities
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):*
5. *Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):*
 - a. *Existing:* RSA 9B
 - b. *Proposed:* TLU Goal 2 – Reduce Vehicle Miles Traveled (particularly those actions involving the expansion or improvement of bus and rail service).

6. Timeframe for Implementation: Model ordinances could be developed within one year. State legislation and funding would be required to implement a mandatory program
7. Anticipated Timeframe of Outcome: Mid- to long term

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism only
 - ii. Timing of Benefits:
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: This would lead to the protection of rural open space, reduced reliance on single occupancy vehicles as well as reduced emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. Compact development patterns and increased use of public transportation encourage more walking.
 - c. *Social*: More compact development patterns foster greater social connectivity. Transit-oriented development can foster positive economic development for communities.
 - d. *Other*:
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Limited technological requirements.
 - b. *Economic*: Bus and rail service extensions will be costly.
 - c. *Statutory/Regulatory*: Voluntary programs would need to be adopted on a municipal level and require extensive promotional efforts to produce significant results. Mandatory programs would require significant legislative efforts to adopt, both for the land use legislation and the parallel transportation funding.
 - d. *Social*: There may be resistance as the public may perceive any type of “dense” development to be bad.
5. Other Factors of Note:
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO₂ emissions from the transportation and land use sector.
7. References:

TLU Action 2.C.3 – Develop Model Zoning for Higher-Density, Mixed-Use Development

Summary

Develop model zoning regulations to promote and facilitate higher-density, mixed-use, walkable development (including affordable housing) in designated areas of a community. Encourage, assist, or require municipalities to adapt and implement the model zoning and regulations. Areas developed with these characteristics have lower GHG impacts than other forms of development (e.g., they generate fewer car trips, shorter trips, and have a smaller development footprint per unit). Grants for specific technical assistance to support implementation could be awarded to communities (under TLU Action 2.C.8) and/or incentives implemented to promote adoption (e.g., access to additional state grants under TLU Action 2.C.4).

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The state and/or regional planning agencies could draft model zoning regulations that set standards for compact, mixed-use, walkable development (including affordable housing). The model regulations would specify what “smart growth” means to the state and would provide the foundation for a program to encourage designated “growth centers.” A growth center program could be:
 - A voluntary program with incentives, such as state funding priority (TLU Action 2.C.4) or increased technical assistance (TLU Action 2.C.8) that encourages designation of municipal growth centers at locations deemed to be desirable by the state and/or region, or
 - A mandatory state-legislated process requiring that communities (perhaps of a certain minimum size) designate municipal growth centers.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. Method of Establishment (*e.g., legislation, executive order*):
 - i. A voluntary program would require the State OEP, with others (e.g., Regional Planning Commissions, DES) to develop a model zoning ordinance that defines standards and criteria for compact, mixed use development. The implementing agency could then promote, educate and assist interested municipalities in pursuing adoption of the model regulations (see also TLU Action 2.C.8).
 - ii. A mandatory program would require communities to designate a specified area(s) through zoning for higher density, mixed-use development.
 - iii. Under either a voluntary or mandatory program, designation of a specified area (e.g., “growth center”) could be tied to eligibility for a variety of state funding opportunities such as transportation, school aid, environmental grants, CDGB, etc (see Action 2.C.4).
 - b. Resources Required: Development of a model ordinance could be accomplished, as a priority project, with redirection of existing state staff. Promoting, educating and providing technical support to communities seeking to implement the model regulations would likely require administrative funding support to the designated state agency or the regional planning commissions (see Action 2.C.8). A mandatory program would require additional rulemaking responsibility across all affected state funding agencies and likely additional staff resources to manage and monitor program compliance.
 - c. Barriers to Address (*especially for medium to low feasibility actions*): Municipalities can currently adopt this type of zoning on their own, but have not – therefore part of this action will need to focus on identifying and removing existing barriers (e.g., public acceptance, lack of resources to implement). A purely voluntary approach of providing a model is unlikely to result in significant changes in land use to reduce GHG impacts.

A mandatory program would require state rulemaking procedures to be followed, and likely legislative authorization. Staff resources to pursue broad municipal adoption (either voluntary or mandatory) would

require additional state agency or regional planning commission financial support that might be derived from other climate change regulatory fees.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation:* Legislature, OEP and/or DES and/or regional planning commissions and municipalities.
 - b. *Parties Paying for Implementation:* Administrative costs for a voluntary program would be paid through implementing state agencies. A mandatory program would require coordination and monitoring of local compliance, resulting in added administrative support costs.
 - c. *Parties Benefiting from Implementation:* Communities that participated in the program would benefit from reduced costs of infrastructure services resulting from more compact development patterns and potentially, greater access to state and federal funding.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): RSA 9B, DOT funding, DES funding, CDBG funding, etc.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:* RSA 9B
 - b. *Proposed:* Transportation and Land Use Goal 2: Reduce Vehicle Miles Traveled
6. Timeframe for Implementation: A totally voluntary program could be implemented in less than a year (although it may take more time to identify and implement accompanying incentives) with municipal adoption taking 10 years or more to produce meaningful results. A mandatory program would likely require legislative approval and associated rulemaking requirements by designated funding agencies – assume 2-3 years to fully implement the program.
7. Anticipated Timeframe of Outcome: Because the program is based on changing land use development patterns, through local regulation, the outcomes for more compact, mixed use development would occur over decades. A mandatory program would be expected to reduce the implementation timeframe significantly.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism only
 - ii. Timing of Benefits:
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental:* More compact, mixed-use development will reduce energy consumption for transportation and possibly buildings. It will foster greater use of public transportation and reduce the level of development in rural areas of the state. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and

pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.

- b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. Compact development patterns and increased use of public transportation encourage more walking.
- c. *Social:* More compact development patterns foster greater social connectivity. Positive economic development within a community
- d. *Other:*

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

- a. *Technical:* Model ordinances should produce no technical challenges. Coordination of targeted grant funding and technical assistance will require close coordination and cooperation with affected state agencies.
- b. *Economic:* Designated growth centers would likely generate positive economic development within a community and provide for efficient/maximum use of municipal infrastructure investments; however, can be challenging to coordinate public funding to implement necessary infrastructure improvements to support more intensive development.
- c. *Statutory/Regulatory:* Voluntary programs would need to be adopted on a municipal level and require extensive promotional efforts to produce significant results. Mandatory programs would require significant legislative efforts to adopt, both for the land use legislation and the parallel funding incentives.
- d. *Social:* Public education is required to ensure understanding and acceptance of this approach and the benefits it can provide for NH (to overcome public perception that “dense” development is bad.

5. Other Factors of Note:

6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.

7. References:

TLU Action 2.C.4 – Use State Funding and Grants to Encourage Low-GHG-Impact Development

Summary

Through the provision of state funding and grants, encourage municipalities to adopt changes in local land use zoning regulations to promote low-GHG-Impact development (e.g., by adopting standards proposed by TLU Actions 2.C.2 and 2.C.3). Municipalities that adopt appropriate land use regulations would be given priority under existing state funding and grant programs by adding new criteria to competitive grant evaluations and/or by requiring establishment of low-GHG-impact development zones as a prerequisite for funding.

Program Description

1. *Mechanism (i.e., how the policy or program achieves the desired result):* This action is an incentive program to encourage cities and towns to adopt local zoning and development regulations that provide for low-GHG-impact development (i.e., higher-density, compact, mixed-use, walkable areas). To be successful, this program would depend on other initiatives to educate communities on the benefits of low-GHG-impact development and provide assistance to revise local zoning and development regulations. This program is just one of several proposed actions directed toward promoting low-GHG-impact development in New Hampshire communities.

The mechanics of the incentives would depend on the grant/funding programs that the incentives are tied to. For instance, some grants could set low-GHG-impact development as a prerequisite for funding approval. Others, more tangentially related to climate change, could establish “bonus-points” for low-GHG-impact development in reviewing and scoring applications (under a competitive grant process).

2. *Implementation Plan (i.e., how to implement the specific policy or program):*
 - a. *Method of Establishment (e.g., legislation, executive order):* Depending on the existing grant program, and the statutes and administrative rules that govern the program, this may or may not require new legislation and/or revisions to administrative rules to add this incentive based evaluation criteria to each of the individual grant or funding programs.
 - b. *Resources Required:* Primarily existing staff time for those programs that will need changes in legislation or administrative rules. Providing coordination of the changes across programs by one staff person would facilitate the process and reduce total staff burden. New staff could be necessary if broader changes are pursued (e.g., pooling grant funds and prioritizing/review by a single office such as the MA Commonwealth Capital program).
 - c. *Barriers to Address (especially for medium to low feasibility actions):* Ideally, the barriers should be minimal as this is simply adding a single new evaluation criteria to existing grant and funding programs.
3. *Parties Affected by Implementation (i.e., residents, businesses, municipalities, etc.):*
 - a. *Parties Responsible for Implementation:* Primary responsible parties – state agencies and legislature. Secondary responsible parties – municipalities
 - b. *Parties Paying for Implementation:* It is assumed here that staff time to amend programs and amend rules would be borne by the agency administering the grant or other funding mechanism.
 - c. *Parties Benefiting from Implementation:* Ultimately the direct beneficiaries are those communities and locals that implement Low GHG-Impact Development and are recipients of funds or grants from those programs amended to target awards to such locations. Indirectly, where the incentive spurs Low GHG-Impact Development everyone enjoys the benefits of reduced greenhouse gas emissions.
4. *Related Existing Policies and Programs:* Some existing grant and funding programs related to planning, transportation and infrastructure that might be considered sources to implement this initiative through include:
 - Community Development Block Grants
 - Economic Development Assistance Grants

- Federal Aid Highway Grants – CMAQ, TE, and others
- Community Technical Assistance Program (I-93 and NH Estuary Project)
- Housing and Conservation Planning Program
- Watershed Restoration/Assistance Grants
- Alternative Fuel Vehicles and Fueling Infrastructure
- Brownfields Assessment Grants
- Coastal Competitive Grants
- Drinking Water Source Protection
- Drinking Water Supply Land Grant
- Public Water Supply
- Wastewater Treatment Revolving Loan Fund
- Regional Environmental Planning Program

Note: This is not to be construed as an exhaustive list; nor is it appropriate to apply this action item to all state funding programs. Additionally, this list does not guarantee that any given program can be modified as is proposed by this implementation action given the particular intricacies of the individual programs (e.g., Federal program requirements/restrictions). Some state programs already have incorporated some consideration of “smart growth principles” in the evaluation of applications.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. *Existing:*

- OEP’s Housing and Conservation Planning Program (HCPP) provides grant funds to municipalities to plan for housing and conservation in a unified manner. The funds may be used for data collection and mapping, visioning, master plan updates, and zoning and regulation updates. In other words, grant funds to perform the basic work needed for municipalities to utilize the incentive this action intends to implement.
- The “Innovative Land Use Planning Techniques: A Handbook for Sustainable Development” prepared by the nine regional planning commissions through their Regional Environmental Planning Program (REPP) grant funds from DES, provides several model ordinances including an energy efficient development ordinance that could be utilized by municipalities to establish Low GHG-Impact Development areas.
- RSA 9-B:2 states: “It shall be the policy of the state of New Hampshire that state agencies act in ways that encourage smart growth.” (See RSA 9-B:4 for a list of smart growth policy statements).
- RSA 9-B:6 requires the Council on Resources and Development to evaluate state agency compliance with the smart growth policy including (but not limited to):
 - Progress in complying with expenditure requirements of RSA 9-B:4
 - Progress in coordinating agency activities to encourage smart growth
 - Efforts to encourage smart growth development within agency operating procedures, granting policies, and regulatory framework.

b. *Proposed:*

- TLU Action 2.C.2 – Develop Model Zoning to Support Bus/Rail Transit. Such an effort could serve as a model low-GHG-impact development standard/mechanism.
- TLU Action 2.C.3 – Develop Model Zoning for Higher-Density, Mixed-Use Development. Such an effort could serve as a model low-GHG-impact development standard/mechanism.
- TLU Action 2.C.8 – Continue/Expand Funding, Education, and Technical Assistance to Municipalities. Such education and outreach would be necessary to provide a base of information to promote and institute low-GHG-impact development through the proposed program.

6. **Timeframe for Implementation:** One to two years should be allocated to successfully implement this action. Time will be needed to evaluate existing grant and funding programs, identify and detail changes that need to be made, and then proceed through either (or possibly both) the legislative process or the administrative rules making process. The working group suggests implementing this action in the early-mid-term (2012-2015), to allow municipalities the opportunity to respond to other technical assistance and incentives provided under other actions to adjust their zoning in preparation for and response to the expected altering of state funding criteria.
7. **Anticipated Timeframe of Outcome:** Long-term, allowing for communities to institute Low GHG-Impact Development and state agencies to amend their grant programs. In theory, while the municipality can be instituting Low GHG-Impact Development simultaneous to grant and funding programmatic changes being implemented, many communities may not be spurred into action until after the incentives are in place, thus pushing the action's anticipated timeframe to see true positive outcomes further out.

Program Evaluation

1. **Estimated CO₂ Emission Reduction:** Not individually quantified but included as part of TLU Goal 2.
2. **Economic Effects:**
 - a. **Costs:**
 - i. **Implementation Cost:** Low
 - ii. **Timing:** Immediate / higher initial costs
 - iii. **Impacts:** State government
 - b. **Savings:**
 - i. **Potential Economic Benefit:** Supporting mechanism only
 - ii. **Timing of Benefits:**
 - iii. **Impacts:**
3. **Other Benefits/Impacts:** Any additional benefits would be secondary ones derived from the development behavior induced through the grant and funding incentive.
 - a. *Environmental:* Focusing development in already developed areas generally reduces the negative environmental impacts. It would also reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health:* Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease. It would lower GHG-impact development forms facilitate walking, increasing personal health
 - c. *Social:* Compact, mixed-use, walkable development supports increased economic activity and community vitality (e.g., citizen interaction)
 - d. *Other*
4. **Potential for Implementation (i.e., including challenges, obstacles and opportunities):**
 - a. *Technical:* The technical resources and expertise required to implement this action already exist.
 - b. *Economic:* This action theoretically does not require additional costs to implement beyond updates to existing programs. However, it will require additional staff time to be devoted to program updates and development that may not have ordinarily been budgeted. This action item ultimately provides an economic incentive to promote Low GHG-Impact Development.

- c. *Statutory/Regulatory*: This action will in some instances require statutory changes and updates to administrative rules.
 - d. *Social*: Current development trends have been leaning more toward “green” design and energy efficiency. This may be easily supportable mechanism to promote such development.
5. Other Factors of Note: Massachusetts, as part of its Clean Energy and Smart Growth-Smart Energy initiative, aimed at promoting sustainable development, maximizing energy efficiency, growing the clean energy sector, and reducing the state’s environmental footprint, has developed and implemented Commonwealth Capital. This policy, through a set scoring system, endorses municipal planning and zoning measures that are consistent with the state’s Sustainable Development Principles and encourages municipalities to implement them by linking state spending programs to the municipal land use practices endorsed through the program. During 2008, eleven state grant programs based funding upon municipal Capital Commonwealth scores (an additional four grant programs are proposed to be added in 2009). For more information visit the Commonwealth Capital website at www.mass.gov/commcap.
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the early mid-term (2012) to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References:

TLU Action 2.C.5 – Enable/Apply a Two-Rate Tax Structure Based on GHG Impacts

Summary

Create a tax structure that enables municipalities to reduce the tax burden on new development located in areas having lower GHG-impacts (e.g., higher-density, mixed-use areas served by public transit) and utilizing GHG-reducing features (e.g., walkable, energy-efficient design) as a means of encouraging this type of development. Alternatively (or additionally), apply a lower tax rate to new/existing development located in areas meeting specified criteria and/or incorporating certain GHG-reducing features. The adjusted tax rates would reflect the higher costs of municipal services and ecosystem impacts associated with sprawl development and the lower costs associated with more efficient development. The tax rate adjustments would complement (one-time) GHG-based impact fees by offering a recurring (annual) cost/benefit to property owners/buyers that is directly related to the choice of development type and location.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Tax relief could be permanent or temporary. This action could be implemented in similar fashion to RSA 79-E, which authorizes municipalities to provide temporary tax relief for substantial rehabilitation of existing buildings in downtowns and community centers, upon request of the applicant and when certain conditions are met. Under this action, any development within a designated area and/or incorporating certain GHG-reducing features could be eligible for temporary (or permanent) tax relief. Similarly, municipalities could be authorized to apply a higher tax rate to new development located outside the targeted area (a permanent version of an impact fee; see TLU Action 2.C.1a). Alternatively (or additionally) tax relief could be provided by state and local government for new and/or existing development meeting specified criteria (could be linked to TLU Actions 2.C.2 and 2.C.3).
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. Method of Establishment (e.g., legislation, executive order): Legislative authorization and local/municipal adoption.
 - b. Resources Required: Resources for analysis to develop program, some increased administrative burden to state and/or local government with implementation.
 - c. Barriers to Address (*especially for medium to low feasibility actions*): Public acceptance of preferential tax treatment, potential increase in tax burden on other property
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. Parties Responsible for Implementation: State government and legislature; municipalities.
 - b. Parties Paying for Implementation: State and local government (to develop and implement program); other tax payers (through reduced tax revenues from targeted development)
 - c. Parties Benefiting from Implementation: Landowners/developers within designated areas; communities trying to encourage downtown revitalization
4. Related Existing Policies and Programs: RSA 79-E, *Community Revitalization Tax Relief Incentive*
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. Existing:
 - b. Proposed: Other policies that reduce the cost of low-GHG impact location decisions (e.g, location-efficient mortgages, GHG-based impact fees).
6. Timeframe for Implementation: Subject to legislative process – likely 2 years. Because of the need for substantial study and research to implement (and likely public resistance), the working group suggests deferring

implementation of this action to later years. This timing also allows other policies designed to create incentives and support alternative development location choices to be implemented in advance of “pricing” changes.

7. Anticipated Timeframe of Outcome: Although would expect to see immediate changes in some development decisions, the full effect would be realized over time as future investment and development occurs and ultimately creates a different future land use pattern than under the status quo.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Immediate / higher initial cost
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism only
 - ii. Timing of Benefits:
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: Focusing development in already developed areas generally reduces the negative environmental impacts
 - b. *Health*: Low GHG-impact development forms facilitate walking, increasing personal health
 - c. *Social*: Compact, mixed-use, walkable development supports increased economic activity and community vitality (e.g., citizen interaction)
 - d. *Other*:
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Conceptually easy, but details to implement could be challenging.
 - b. *Economic*: Unsure of economic implications (requires further study).
 - c. *Statutory/Regulatory*: Very difficult to change tax structure at state level, difficult to implement as enabling legislation, particularly without supporting research.
 - d. *Social*: Could face significant public resistance.
5. Other Factors of Note: This dual tax strategy is based on the well established concept of a *Pigouvian tax* (after economist Arthur Cecil Pigou) levied to correct the negative externalities of a market activity. As proposed here for property taxes, Pigovian taxes are widely levied on polluters to encourage them to reduce pollution and to provide revenue to counteract the negative effects of the pollution.
6. Level of Group Interest: Low. The working group recognized the need for substantial additional research on this action and considered this a supporting action to undertake in the long-term, as an additional incentive mechanism once other actions to encourage compact development were in place (*i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO₂ reductions from the transportation and land use sector*)
7. References:

TLU Action 2.C.6 – Promote Availability and Use of Location Efficient Mortgages

Summary

Explore the potential to expand the availability of Location Efficient Mortgages (LEMs), which are designed to recognize the reduced transportation costs associated with living in compact, mixed-used, walkable areas and/or availability of public transportation. LEMs provide a financial incentive for homeowners to locate in such areas and, consequently, provide support to developers who undertake projects of this type. By assigning economic value to efficient development, LEMs promote affordable living in close proximity to work and services.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Location Efficient Mortgages typically require a smaller down payment, competitive interest rates, and/or more flexible criteria for financial qualification to encourage homeownership in qualifying areas. In doing so, LEMs provide an incentive for homeowners to locate in qualifying areas and an incentive for development in areas having reduced GHG impacts. The financial benefits of LEMs increase the affordability of living in close proximity to work and services and contribute to reduced VMT in comparison with the travel needs of similar households located farther out.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: State government could work with select banking institutions to evaluate the potential applicability of this technique within NH. If appropriate, these entities would then work to establish and publicize an LEM program.
 - b. *Resources Required*: Staff time to explore opportunities and work with state mortgage providers.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Potential reduced applicability in New Hampshire due to lower-availability of transit.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Mortgage providers
 - b. *Parties Paying for Implementation*: State government, mortgage providers
 - c. *Parties Benefiting from Implementation*: Home purchasers/borrowers
4. Related Existing Policies and Programs:
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*:
 - b. *Proposed*: Proposed legislation at the Federal level may increase the availability of this product through national entities (Freddie Mae, Freddie Mac). Tax policies that reduce the cost of low-GHG impact location decisions (e.g., two-rate tax structure, GHG-based impact fees).
6. Timeframe for Implementation: Could be implemented in a relatively short time frame, provided NH mortgage providers are receptive. Likely more effective once other actions to increase availability of local transit and “in-town” housing are implemented. Proposed for mid/late-term implementation.
7. Anticipated Timeframe of Outcome: Full effect of this action would not be felt for many years, but could help shape future land use development patterns to reduce travel demand.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.
2. Economic Effects:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Moderately low
 - ii. Timing: Constant / even
 - iii. Impacts: Consumer – evenly distributed
3. Other Benefits/Impacts:
 - a. *Environmental*: Focusing development in already developed areas generally reduces the negative environmental impacts
 - b. *Health*: Low GHG-impact development forms facilitate walking, increasing personal health
 - c. *Social*: Compact, mixed-use, walkable development supports increased economic activity and community vitality (e.g., citizen interaction)
 - d. *Other*:
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Easy action to implement provided mortgage lenders are receptive (may not be substantial savings available from “in-town” locations without transit available).
 - b. *Economic*:
 - c. *Statutory/Regulatory*: Could be supported by Federal legislation; few/unknown state legislative/regulatory obstacles.
 - d. *Social*:
5. Other Factors of Note:
6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the mid-term (*i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO₂ reductions from the transportation and land use sector*).
7. References:

TLU Action 2.C.7 – Establish Entity(ies) to Support Compact Land Use Patterns and Open Space Preservation

Summary

Establish an educational and administrative support entity (at state or regional level) to facilitate implementation of transfer of development rights (TDR) or density transfer credit (DTC) programs, through which open space would be preserved in targeted areas in exchange for higher-density development in designated areas. A regional or state organization would be tasked with promoting this tool, assisting communities to develop and adopt the necessary zoning and regulations, and implementing the program at the municipal level (e.g., valuing “density” to be transferred, processing transactions). A successful TDR program could facilitate the creation of compact land use patterns that reduce transportation energy consumption, reduce municipal infrastructure delivery costs and energy consumption, preserve rural open space, and support public transportation.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Regional or state agency(ies) would be designated and funded to promote and assist municipalities in adopting and implementing transfer of development rights programs. Through municipal implementation of density transfer mechanisms, real estate development could be directed to designated development or growth locations (*i.e., town and city centers*). This action would assist in creating more compact, mixed-use development that could significantly reduce transportation-based energy consumption and foster greater provision for, and use of, public transportation. Adjacent municipalities could also choose to execute inter-municipal agreements to establish sending and receiving zones across municipal boundaries. The state or regional entities could also use their expertise to assist participating municipalities in managing the implementation of the local programs.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: State funding to develop and maintain the expertise to implement the program. The program could be voluntary, incentivized or mandatory. If it was voluntary it would rely exclusively on the education and promotional efforts of the regional or state agencies. An incentive based program would link the availability of a wide variety of funding and grant opportunities to adoption of the program in participating municipalities. A mandatory program would require municipalities to establish a transfer of development rights program as part of their master planning and zoning process.
 - b. *Resources Required*: A legal entity with sufficient staff resources and expertise to educate and advise municipal boards on how to establish zoning and development regulations that support the program and administer the density transfer program. Initially would require state funding, but eventually could be self-funded by a portion of the density transfer payments.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: A funding mechanism to support creation of the administering entity(ies) and program.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Municipalities, regional planning commissions, and/or the State of New Hampshire.
 - b. *Parties Paying for Implementation*: State, regional and/or local governments initially, eventually supported by development.
 - c. *Parties Benefiting from Implementation*: Potentially everyone, especially if receiving zone municipalities desire additional density, development and tax base.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Existing state planning and zoning legislation; individual municipal master plans and development regulations; regional and state land use plans; NGO land conservation programs.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing*: RSA 9-B. Innovative Land Use Techniques Handbook, which contains a model ordinance for Density Transfer Fee.
 - b. *Proposed*: Other Actions under 2.C.
6. Timeframe for Implementation: For a voluntary program, the enabling legislation for funding could occur within two years. Developing in-state educational and administrative resources could be developed in one year. Changes in local land use regulations would take at least 3-5 years. An incentivized program could be established in the same time frame. A mandatory program would have the added impact of a more difficult legislative approval process that might take several sessions of the legislature to approve.
7. Anticipated Timeframe of Outcome: The voluntary approach would likely take three to five years to begin achieving desired outcomes. Ten to thirty years to achieve sufficient density transfer volume to produce measurable carbon footprint benefits. An incentivized program should shorten the timeframe to produce significant and measurable carbon footprint benefits. A mandatory program would specify a compliance date by which all communities with zoning and development regulations would have to have the necessary regulations and procedures in place. This would result in the shortest timeframe to achieve measurable outcomes.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.
2. Economic:
 - a. Costs:
 - i. Implementation Cost: Low
 - ii. Timing: Constant / even
 - iii. Impacts: State government
 - b. Savings:
 - i. Potential Economic Benefit: Supporting mechanism only
 - ii. Timing of Benefits:
 - iii. Impacts:
3. Other Benefits/Impacts:
 - a. *Environmental*: Preservation of New Hampshire's rural character and critical natural resource features (wildlife habitat, agriculture/forest land, water supply areas)
 - b. *Health*: Increased walking, less obesity
 - c. *Social*: Preservation of traditional NH pattern of land use. Preserves economic value of current zoning but provides for an alternative future development scheme.
 - d. *Other*: Increased potential for critical mass to support more extensive public transportation if densities of 8+dwelling units per acre can be achieved.
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
 - a. *Technical*: Used extensively throughout the U.S. = many replicable models.
 - b. *Economic*: Shift from rural and suburban development patterns to small urban is supported by market desire for smaller lot sizes that are closer to in-town amenities and employment.
 - c. *Statutory/Regulatory*: TDR is permitted by state planning enabling legislation. Regional or statewide support systems and marketing to individual municipalities will require extensive effort. Some

communities may desire additional growth and density. Others may resist loss of potential future tax base expansion if they are “sending” communities

d. *Social*: Generally, TDR is supportive of NH goal of protecting state’s rural character.

5. Other Factors of Note: Based on criteria established by the governing body, there are two implementation structures: 1) developers directly acquire open space or conservation easements in designated sending zones and convey them to a designated land stewardship entity; in exchange they receive additional development density in designated receiving zones; and 2) developers pay a specified “density transfer fee” to the administering entity in exchange for additional development density in a receiving zone, and the administering entity uses the transfer fee to acquire open space/conservation easements in sending zones.
6. Level of Group Interest: Moderate. The working group considered this a supporting action to undertake in the near-term (i.e., supports other actions and/or achieves moderate reductions but not considered “essential” to achieve substantial CO2 reductions from the transportation and land use sector).
7. References:

TLU Action 2.C.8 – Continue/Expand Funding, Education, and Technical Assistance to Municipalities

Summary

Support and expand funding and technical assistance made available through existing programs to promote:

1) coordinated local planning for land use, transportation, and the environment, and 2) policy changes at the local level that result in land use with reduced GHG impacts. Update existing publications where appropriate to incorporate GHG considerations and prepare new materials where needed. Provide increased coordination between, and expansion of, existing programs now implemented by various agencies such as the Office of Energy and Planning, the Department of Environmental Services, and the Regional Planning Organizations, as well as professional and other associations such as the New Hampshire Planners Association, Local Government Center, UNH Cooperative Extension, and Clean Air Cool Planet.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): There are a variety of policy actions that could be implemented to further marketing, education, and technical assistance to municipalities. These include:
 - a. Establish a clearinghouse of all existing resources and an initial targeted outreach process designed to “jump start” local GHG planning initiatives.
 - b. Continue and/or expand outreach on the connections between land use, transportation, and the environment to incorporate GHG considerations into local planning efforts and demonstrate ways to adjust land use patterns to achieve GHG savings. Examples of land use planning methods that can reduce GHG emissions include conserving important natural resource areas, directing development toward preferred locations, and improving the design of new development to retain community character.
 - c. Expand and/or continue successful grant and specific technical support efforts such as the I-93 Community Technical Assistance Program (CTAP), New Hampshire Estuary Project Community Technical Assistance Program, Housing and Conservation Planning Program, Regional Environmental Planning Program, and Nashua Regional Planning Commission’s iTRaC (Integrating Transportation and Community Planning) Program.
 - d. Ensure easy access to necessary publications, tools, and information such as model ordinances, factsheets, and GIS data.
 - e. Continue and/or expand existing conferences, trainings, and workshops that emphasize the connections between land use, transportation, and environmental planning.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Marketing, education and technical assistance rarely requires new legislation, executive orders or other enabling mandates, thus simplifying its method of establishment. Legislative action may be required to increase funding levels to expand existing programs.
 - b. *Resources Required*: Resources are the key to successful implementation and establishment of marketing, education and technical assistance. Key resources required include:
 - Staff time and expertise to coordinate efforts and create and provide new initiatives and products.
 - Funding to produce new products, increase the level of grants and/or assistance provided, and expand training opportunities without significant costs to the end user/participant.
 - A centralized clearinghouse of resources including training opportunities and publications.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Barriers to providing additional outreach and education include:

- Town budgets include little or no funds to pay conference or workshop registration fees for citizen or staff planners or to purchase new publications.
- Cost to produce new materials.
- Most citizen planners work full-time jobs and have little time for training, reviewing outreach publications or attending workshops.
- Time to produce new materials and cost to hire new staff to develop new products.
- Need for more innovative training opportunities like via the web, discussion boards, public access stations.
- Finding a suitable time of year to hold new or additional workshops and trainings – April through October are eliminated as many existing conferences are held either right before or after summer vacations.
- Marketing – getting information out in a way that makes it appealing

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):

a. *Parties Responsible for Implementation:*

- Primary responsible parties – Office of Energy and Planning and the Department of Environmental Services
- Secondary responsible parties – Regional Planning Commissions, UNHCE, Clean Air Cool Planet, Local Government Center, NH Planners Association, additional state and regional organizations

b. *Parties Paying for Implementation:* The primary responsible parties will need to identify additional and necessary funding resources. While some education and outreach can be accomplished through existing program staff, new funding will be necessary for additional resources and materials production. Additionally, the more elaborate and concerted the education and outreach program is, increased staffing capacity may be necessary, however, additional staffing may not be necessary for this action item alone but may be combined with many other proposed action items in order to create a coordinated state program.

c. *Parties Benefiting from Implementation:* NH Municipalities and their staff and volunteer boards.

4. Related Existing Policies and Programs: (*Note: The following list is illustrative of the types of programs that might appropriately be involved in implementing this action and should be reviewed and refined at a later date.*)

a. Existing training opportunities include:

- Regional Planning Commission trainings and roundtables
- Planning Board clerk training conducted by the NH Association of Regional Planning Commissions
- Local Government Center (LGC) fall Law Lecture series
- LGC and UNH T2 “Hard Road to Travel”
- Northern New England Chapter of the American Planning Association Annual Conference
- NH Planners Association Annual Spring Conference
- NH Housing Finance Authority Annual Conference
- Clean Air Cool Planet
- Carbon Coalition’s local energy committee trainings

b. Existing educational publications include:

- Clean Air Cool Planet’s online Community Tool Kit
(http://www.cleanair-coolplanet.org/for_communities/toolkit_home.php)

- Planner's Handbook on Energy Efficiency and Climate Change (<http://www.nhplanning.com/Energy/energyhb.htm>)
- DES Fact Sheets (<http://www.des.nh.gov/openme.htm>)
- OEP Technical Bulletins (<http://www.nh.gov/oep/resourcelibrary/TechnicalBulletins.htm>)
- DES/NHARPC's Innovative Land Use Planning Techniques: A Handbook for Sustainable Development (<http://www.des.nh.gov/REPP/index.asp?go=ilupth>)

c. Existing grants and funding opportunities that have an educational component include:

- Housing and Conservation Planning Program
- Community Technical Assistant Program
- NH Estuary Project Community Technical Assistance Program
- Regional Environmental Planning Program.
- Nashua iTRaC Program (Integrating Transportation and Community Planning)

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):

a. *Existing*:

b. *Proposed*: TLU Action 2.C.4 – Use State Funding and Grants to Encourage Low-GHG-Impact Development

6. Timeframe for Implementation: One to two years should be allocated to successfully implement this action. Time will be needed to evaluate existing publications, training, and grant programs, identify and detail changes that need to be made, and then implement those changes.
7. Anticipated Timeframe of Outcome: Once initiated, education and outreach efforts should be an ongoing effort without a specified end-date. Membership on local boards and commissions is continually changing, creating a perpetual need for additional training and up-to-date outreach publications. This action supports implementation of near- and longer-term changes in local land use policies that will help reduce carbon emissions from transportation.

Program Evaluation

1. Estimated CO₂ Emission Reduction: Not individually quantified but included as part of TLU Goal 2.

2. Economic Effects:

a. Costs:

- | | |
|-------------------------|------------------|
| i. Implementation Cost: | Low |
| ii. Timing: | Constant / even |
| iii. Impacts: | State government |

b. Savings:

- | | |
|--------------------------------|---------------------------|
| i. Potential Economic Benefit: | Supporting mechanism only |
| ii. Timing of Benefits: | |
| iii. Impacts: | |

3. Other Benefits/Impacts: Any additional benefits would be secondary ones derived from the development behavior induced through the grant and funding incentive.

- a. *Environmental*: Focusing development in already developed areas generally reduces the negative environmental impacts
- b. *Health*: Low GHG-impact development forms facilitate walking, increasing personal health

- c. *Social*: Compact, mixed-use, walkable development supports increased economic activity and community vitality (e.g., citizen interaction)
 - d. *Other*:
4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):
- a. *Technical*: The technical resources and expertise required to implement this action already exist.
 - b. *Economic*: This action may require additional funding resources to prepare new publications and innovative training mechanisms such as online/on-demand training modules.
 - c. *Statutory/Regulatory*:
 - d. *Social*: Current development trends have been leaning more toward “green” design and energy efficiency. This may be easily supportable mechanism to provide greater access to information related to such development.
5. Other Factors of Note: While education and outreach is a key and easily acceptable action item, it often needs to be coupled with an incentive that will encourage municipalities to take the “next step” and implement that which they have learned. Incentives might include direct technical assistance and grant funding that provide either direct staff time or the necessary funds to implement new initiatives. A recent example includes the NH Housing Finance Authority’s “Inclusionary Zoning Implementation Program” that jointly provides grant funds and technical assistance to municipalities to adopt inclusionary housing ordinances. The Authority preceded the grant program with an education campaign centered on the benefits and need for inclusionary zoning.
6. Level of Group Interest: High. The working group considered this an essential action to undertake in the near-term to achieve significant reductions in CO2 emissions from the transportation and land use sector.
7. References: